

**PHILIP MORRIS PRODUCTS, S.A.,**  
**Petitioner,**  
**v.**  
**RAI STRATEGIC HOLDINGS, INC.,**  
**Patent Owner**

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**IPR2020-01602**  
**Patent 9,901,123**

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**Petitioner's Demonstratives**  
**Jan. 6, 2022**

# The '123 Patent

## Independent Claims 1 & 15

“mixture ... wicked into contact”

“puff-actuated controller”

## Dependent Claims

“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)

# The '123 Patent

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nicotine formulations (claims 6 and 19)



# The '123 Patent

(12) **United States Patent**  
Robinson et al.

(10) Patent No.: **US 9,901,123 B2**  
(45) Date of Patent: **\*Feb. 27, 2018**

(54) **TOBACCO-CONTAINING SMOKING ARTICLE**

(71) Applicant: **RAI STRATEGIC HOLDINGS, INC.**, Winston-Salem, NC (US)

(72) Inventors: **John Howard Robinson**, Kernersville, NC (US); **David William Griffith, Jr.**, Winston-Salem, NC (US); **Billy Tyrone Conner**, Clemmons, NC (US); **Evon Llewellyn Crooks**, Mocksville, NC (US); **Dempsey Bailey Brewer, Jr.**, East Bend, NC (US)

(73) Assignee: **RAI Strategic Holdings, Inc.**, Winston-Salem, NC (US)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.  
This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/286,087**

(22) Filed: **Oct. 5, 2016**

(65) **Prior Publication Data**  
US 2017/0020200 A1 Jan. 26, 2017

**Related U.S. Application Data**  
(63) Continuation of application No. 14/527,287, filed on Oct. 29, 2014, which is a continuation of application (Continued)

(51) **Int. Cl.**  
*A24F 1/00* (2006.01)  
*A24F 47/00* (2006.01)  
(Continued)

(52) **U.S. Cl.**  
CPC ..... *A24F 47/008* (2013.01); *A24B 13/02* (2013.01); *A24B 15/12* (2013.01); *A24B 15/167* (2016.11);  
(Continued)

(58) **Field of Classification Search**

None  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

1,514,682 A 11/1924 Wilson  
1,771,366 A 7/1930 Wyss et al.  
(Continued)

**FOREIGN PATENT DOCUMENTS**

AU 276250 7/1965  
CN 1541577 11/2004  
(Continued)

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Lu, Zhang, "Safe Substitute", China Daily, Jul. 11, 2005.  
(Continued)

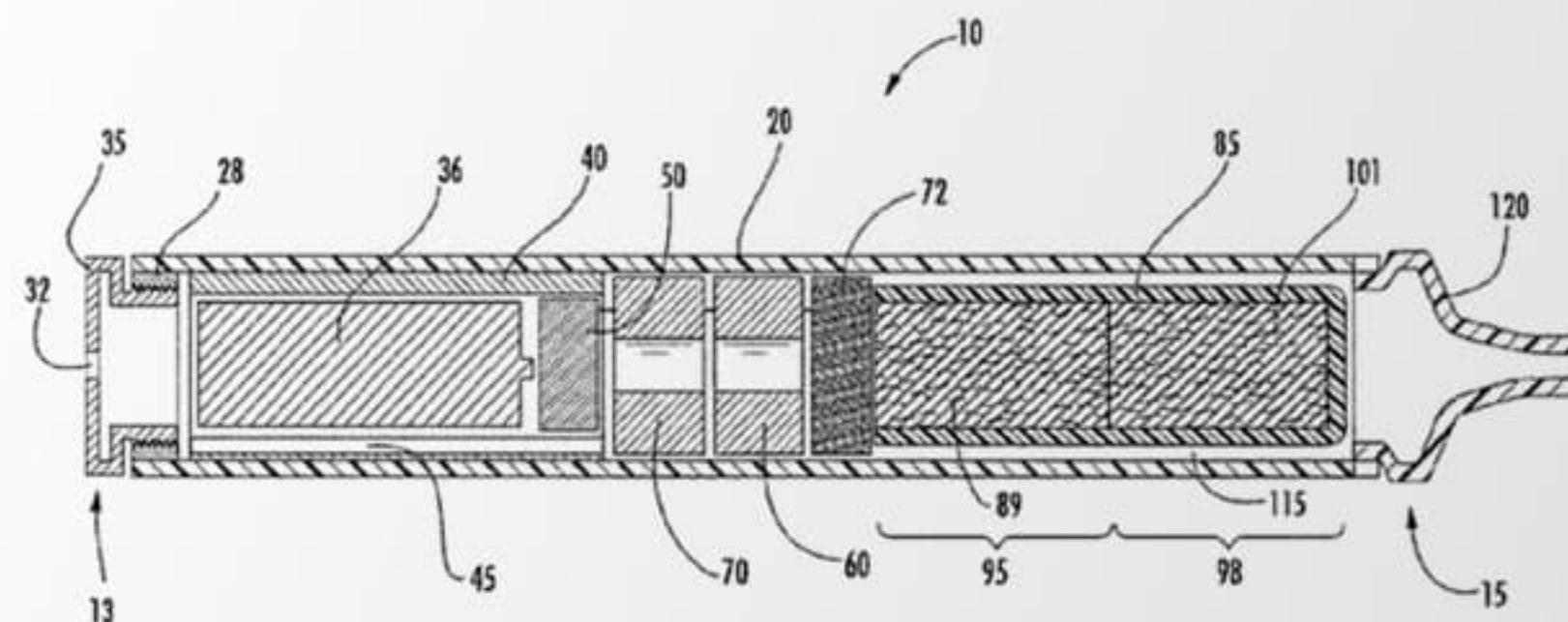
*Primary Examiner* — Michael H Wilson

*Assistant Examiner* — Phu Nguyen

(74) *Attorney, Agent, or Firm* — Womble Bond Dickinson (US) LLP

(57) **ABSTRACT**

A smoking article may include a cigarette incorporated within an electrically powered aerosol generating device that acts as a holder for that cigarette. The smoking article possesses at least one form of tobacco. The smoking article also possesses a mouth-end piece that is used by the smoker to inhale components of tobacco that are generated by the action of heat upon components of the cigarette. A representative smoking article possesses an outer housing incorporating a source of electrical power (e.g., a battery), a sensing mechanism for powering the device at least during periods of draw, and a heating device (e.g., at least one electrical resistance heating element) for forming a thermally generated aerosol that incorporates components of tobacco. During use, the cigarette is positioned within the (Continued)



Philip Morris Products, S.A.  
Exhibit 1001  
Page 001

(10) **Patent No.:** **US 9,901,123 B2**  
(45) **Date of Patent:** **\*Feb. 27, 2018**

(63) Continuation of application No. 14/527,287, filed on Oct. 29, 2014, which is a continuation of application No. 13/297,983, filed on Nov. 16, 2011, now Pat. No. 8,899,238, which is a continuation of application No. 12/763,890, filed on Apr. 20, 2010, now Pat. No. 8,079,371, which is a continuation of application No. 11/550,634, filed on **Oct. 18, 2006**, now Pat. No. 7,726,320.

'123 Patent (Ex. 1001 at 1)



# The '123 Patent Admits That The Ruyan E-Cigarette Was "Representative" Of Key Components

## Outer Housing

thetically pleasing cover (not shown). A representative outer housing can be of the type possessed by the Ruyan Atomizing Electronic Cigarette available from Ruyan SBT Technology and Development Co., Ltd. As shown, the outer

'123 Patent at 19:56-59

## Electronic Control Components

powered by the battery 36. Representative types of electronic control components are of the type can be of the type possessed by the Ruyan Atomizing Electronic Cigarette available from Ruyan SBT Technology and Development Co., Ltd. See, also, the types of electronic systems set forth in U.S. Pat. No. 4,947,874 to Brooks et al.

'123 Patent at 20:43-47

## Power Sources

regions of the smoking article 10. Representative types of power sources, and representative arrangements thereof within the outer container, are of the type incorporated within a device available as Ruyan Atomizing Electronic Cigarette from Ruyan SBT Technology and Development Co., Ltd. If desired, higher power electrical power sources

'123 Patent at 20:26-33

## End Cover

container 20. A representative end cover or cap 35 can be of the type possessed by the Ruyan Atomizing Electronic Cigarette available from Ruyan SBT Technology and Development Co., Ltd.

'123 Patent at 20:8-11

## Heating Elements

resistance element). Representative types of resistance heating elements are incorporated within a device available as Ruyan Atomizing Electronic Cigarette from Ruyan SBT Technology and Development Co., Ltd. If desired, each of

'123 Patent at 21:45-48

## Cartridges

of the cartridge 85. Representative types of cartridges are of the type incorporated within a device available as Ruyan Atomizing Electronic Cigarette from Ruyan SBT Technology and Development Co., Ltd. can be modified by adding tobacco extract thereto, or by removing at least a portion of the substrate and nicotine-containing material incorporated therein and replacing that removed portion with a tobacco composition. For example, for the embodiment shown in

'123 Patent at 22:6-14

## Mouth-end Piece

outer container, or the like. A representative mouth-end piece can be of the type incorporated within a device available as Ruyan Atomizing Electronic Cigarette from Ruyan SBT Technology and Development Co., Ltd. Alter-

'123 Patent at 24:9-13

## Sensing Mechanisms

desired periods of time. Representative types of sensing mechanism components are incorporated within a device available as Ruyan Atomizing Electronic Cigarette from Ruyan SBT Technology and Development Co., Ltd. See, also, those types of airflow sensing mechanisms proposed in EPO 1,618,803 to Hon; and U.S. Pat. No. 4,735,217 to Gerth et al.; U.S. Pat. No. 4,947,874 to Brooks et al.; and 5,388,

'123 Patent at 20:52-58



# Ruyan Was A Commercially Available Device From The Inventor of Hon

[19] State Intellectual Property Office of the People's Republic of China

[51] Int. Cl.  
A24D 1/18  
A24F 47/00

[12] Utility Model Patent Specification

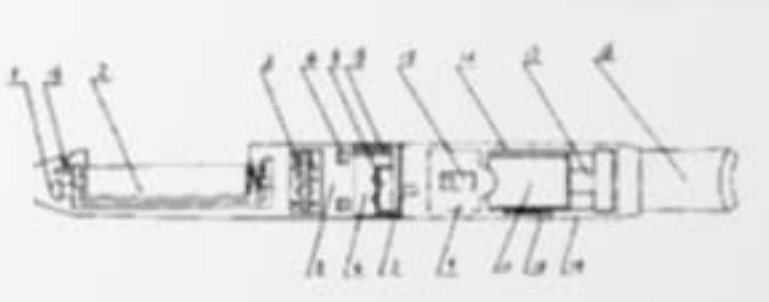
[11] Authorized Publication No. CN 2719043Y

Address Suites 1010-12, 10/F, West Wing, Shun Tak Centre, 168-200 Connaught Road Central, Hong Kong

[73] Patent Assignee Hon Lik

[54] Title of Utility Model: Atomizer Electronic Cigarette

[57] Abstract  
The present utility model relates to an atomizer electronic cigarette containing no tar and only nicotine, comprising an enclosure and a mouthpiece; an air inlet is set on the outer wall of the enclosure; an electronic circuit board, a normal pressure cavity, a sensor, a vapor-liquid separator, an atomizer, and a liquid-supplying bottle are set successively in the enclosure; wherein the electronic circuit board is composed of an electronic switch circuit and a high-frequency generator; a sensor airflow channel is opened on one side of the sensor; a negative pressure cavity is set in the sensor; the atomizer is in contact with the liquid-supplying bottle; an atomization cavity is set inside of the atomizer; a retaining ring to lock the liquid-supplying bottle is set between one side of the liquid-supplying bottle and the enclosure, and an aerosol passage is opened on the other side of the liquid-supplying bottle; the air inlet, normal pressure cavity, vapor-liquid separator, atomizer, aerosol passage, gas vent, and mouthpiece are connected successively. There is no tar in the present utility model, which greatly reduces the risk of cancer; users can still have the feeling and excitement of smoking; there is no need of ignition, and there is no fire hazard.



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Philip Morris Products, S.A.  
Exhibit 1005  
Page 001

Ruyan Website (Dec. 27, 2005)



Ex. 1013 at 7

## SCIENCES ET Avenir

Hon Lik is the Chinese pharmacist who invented the electronic cigarette.

Ex. 1025 at 1

## Los Angeles Times

Hon got his first patent on the e-cigarette in 2003 and introduced it to the Chinese market the next year. The company he worked for, Golden Dragon Holdings, was so inspired that it changed its name to Ruyan (meaning "like smoke") and started selling abroad.

Ex. 1018 at 2



# The '123 Patent Inventors Tore Down A "Commercially Available" Ruyan E-Cigarette Before Filing The '123 Patent

## John Robinson ('123 Inventor)

From: Robinson, John H.

Sent: Friday, August 04, 2006 9:37 AM

\* \* \*

I visited with my colleague, Steve Dworkin, at Duke yesterday and obtained 2 more electric cigars and 2 more electric pipes for study here at RJRT. Steve brought these back for me from his recent trip to China where he met with executives from the Ruyan Company at their main offices in Beijing. He has direct

Ex. 1024 at 2

From: Robinson, John H.

Sent: Friday, August 04, 2006 4:39 PM

\* \* \*

I am putting together a plan to dissect/analyze the hardware from the pipe and cigar, and will also initiate a plan to get some analytical data, e.g., how much nicotine and propylene glycol are yielded during puffing, using some R&D smoking machines. These data could be used to support an HRRC (Human

Ex. 1024 at 1

Ruyan Website (Dec. 27, 2005)



Ex. 1013 at 7



# The '123 Patent Inventors Tore Down A "Commercially Available" Ruyan E-Cigarette Before Filing The '123 Patent

## RJR Teardown

### AUTHORS:

Kevin Hatch<sup>1</sup>  
Eric Hunt<sup>2</sup>  
David Griffith<sup>3</sup>  
John Robinson<sup>3</sup>

DATE: September 14, 2006

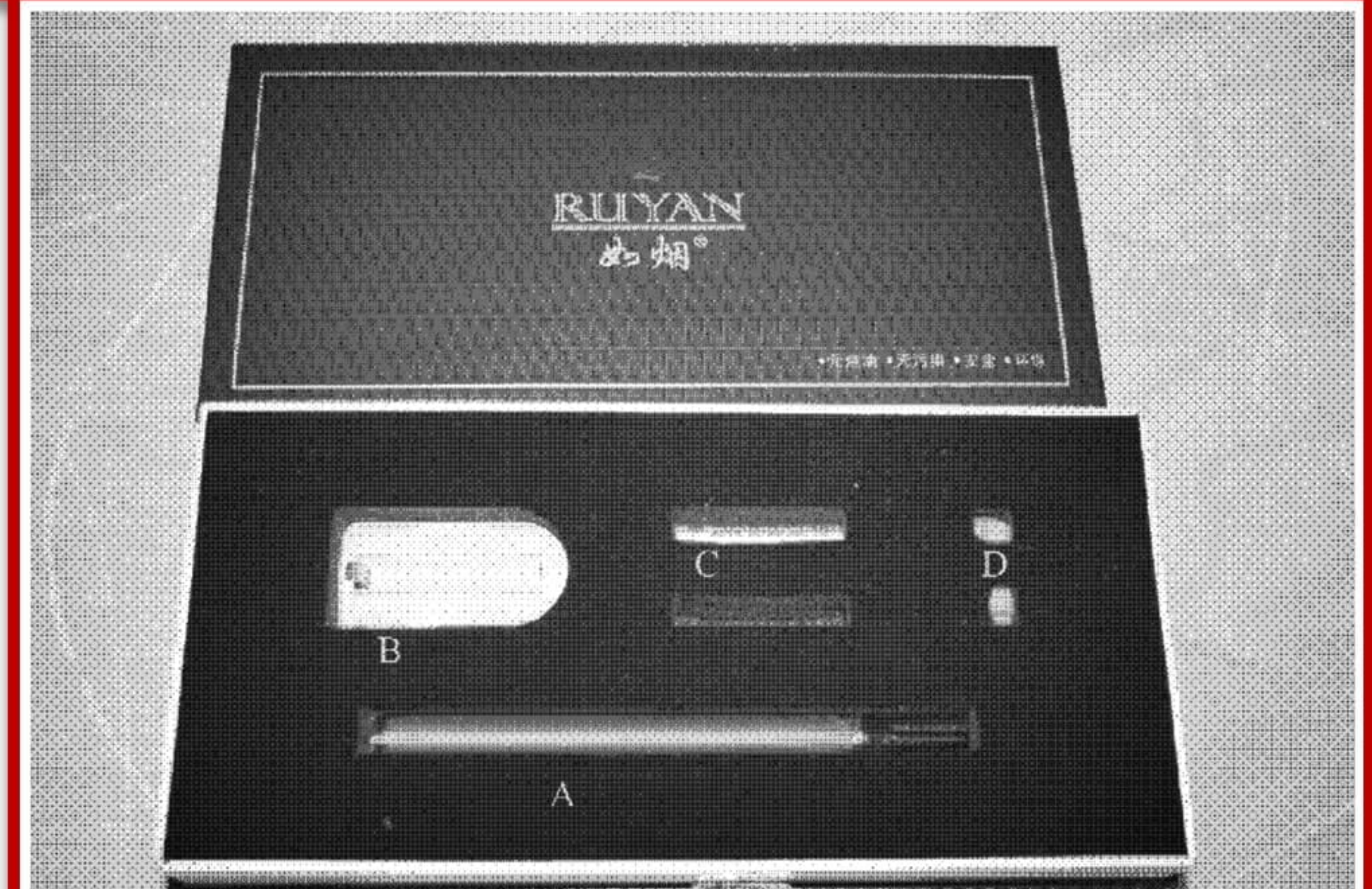
\* \* \*

### PRELIMINARY EVALUATION OF A **COMMERCIALY AVAILABLE** ELECTRIC AEROSOL INHALER FROM CHINA

\* \* \*

**SUMMARY:** The **commercially available** electronic cigar from Beijing SBT RUYAN Technology & Development Co., Ltd, produces a heated aerosol containing tobacco extract and nicotine. The rechargeable battery is easily replaced, as is the cartridge containing the aerosol

Ex. 1023 at 1



Ex. 1023 at 4



## RJR's Teardown of the Ruyan Device Illustrates A POSA's Background Knowledge

“[N]on-prior art evidence of what was known . . . can be relied on for their proper supporting roles, e.g., ***indicating the level of ordinary skill in the art***, what certain terms would mean to one with ordinary skill in the art, and ***how one with ordinary skill in the art would have under-stood a prior art disclosure.***”

*Yeda Research & Dev. Co. v. Mylan Pharms., Inc.*, 906 F.3d 1031, 1041-42 (Fed. Cir. 2018) (internal quotations omitted)



# Petitioner Does Not Rely On Ruyan As Statutory Prior Art

## Petition

- Ground 1: Claims 1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, and 23-26 are Unpatentable Over Hon (Ex. 1005), alone or with Brooks (Ex. 1006) and Whittemore (Ex. 1007);
- Ground 2: Claims 3, 4, 13, 16, and 17 are Unpatentable Over Hon, Whittemore, Brooks, and Susa (Ex. 1008);
- Ground 3: Claims 6 and 19 are Unpatentable Over Hon, Whittemore, Brooks, and Ray (Ex. 1009).

Petition at 3

## Petitioner's Reply

Contrary to Patent Owner's argument, the Petition does not use the RJR Teardown as prior art. Rather, due to its direct relevance to the specification of the '123 Patent, and to the contemporaneous knowledge of the inventors and POSAs, Petitioner and Mr. Fox use it to illustrate a POSA's knowledge of general commercial practices in the art, such as the materials used for various components and the device's general construction. Such usage is proper. *See Yeda*, 906 F.3d at

Petitioner's Reply at 20



# Petitioner Does Not Rely On Ruyan As Statutory Prior Art

## Stewart Fox (Petitioner's Expert)

Q. ...You are using the Ruyan devices to support your invalidity opinions regarding the domestic industry claims of the '123 patent that are at issue in the IPR proceeding, correct?

A. **Again, I'm slightly nervous that if I repeat what you said there will be a legal argument that isn't what I intended, so I'll stick to my original statement: The Ruyan devices are informing me, helping me come to an opinion by informing me of how a person of ordinary skill in the art would have interpreted and understood the Hon '043 patent, and therefore, shows that the claims of the '123 patent are invalid.**

Fox Tr. (Ex. 2011) at 34:2-14



# A POSA Would Be Familiar With Existing Smoking Devices

## Petition

### C. The Person of Ordinary Skill In The Art

A POSA at the time of the purported invention (the October 2006 timeframe) would have had a Bachelor's degree in mechanical engineering, electrical engineering, chemistry, or physics, or a related field, and three to four years of industry experience, or a Master's degree in mechanical engineering, electrical engineering, chemistry, or physics, or a related field, and one to two years of industry experience. Such a POSA would have been familiar with electrically powered smoking articles and/or the components and underlying technology used therein. Fox Decl. ¶¶ 13-18.

Petition at 9-10

## Patent Owner's Response

For purposes of the trial in this proceeding, RAI accepts Petitioner's proposed education and experience level of the POSA. (See Petition at 9-10.) Thus, for Patent Owner's Response at 12



## The '123 Patent

### Independent Claims 1 & 15

“mixture ... wicked into contact”

“puff-actuated controller”

### Dependent Claims

“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)



# Claims 1 & 15: Patent Owner Disputes Only Two Limitations

## Patent Owner's Response

VII.	HON, BROOKS, AND WHITTEMORE DO NOT RENDER CLAIMS 1, 2, 5, 7, 9, 11, 12, 14, 15, 18, 21, AND 23-26 OBVIOUS (GROUND 1).....	20
A.	Claims 1 and 15: “the mixture ... can be wicked into contact with the electrical resistance heater and volatilized” .....	20
	* * *	
B.	Claims 1 and 15: “a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw” .....	44

Patent Owner's Response at i-ii (Table of Contents)



# Claims 1 & 15: Arguments Are Directed Only to Ground 1

## Patent Owner's Sur-Reply

### **IV. GROUND 2 (CLAIMS 3, 4, 13, 16, 17) AND GROUND 3 (CLAIMS 6, 19)**

Petitioner is incorrect that RAI relies solely on its arguments for Ground 1 with respect to both Grounds 2 and 3. (*See Reply at 25-26.*) For Ground 3, RAI specifically argued that claims 6 and 19 would not have been obvious in view of Hon, Whittemore, Brooks, and Ray for additional reasons. (*See POR at 59-61.*) *As*

Patent Owner's Sur-Reply at 21



# Claims 1 & 15: Disputed Limitations

1. An electrically-powered, aerosol-generating smoking article comprising:

an electrical power source within a tubular outer housing having a mouth-end and an end distal to the mouth-end; at least one electrical resistance heater powered by said electrical power source;

**a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw, the controller comprising a sensor adapted for sensing draw on the smoking article by a user; and**

a rod-shaped carrier device engaged with the mouth-end of the tubular outer housing and comprising a cartridge providing a liquid storage compartment containing a mixture comprising a tobacco extract and an aerosol-forming material absorbed within an absorbent fibrous material, the cartridge having a generally tubular shape and adapted for airflow therethrough;

wherein the rod-shaped carrier device is operatively positioned such that, during draw, **the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater** and volatilized to produce a visible mainstream aerosol incorporating tobacco components or tobacco-derived components that can be drawn into the mouth of the user of the smoking article.

'123 Patent, Claim 1

15. An electrically-powered, aerosol-generating smoking article comprising:

an electrical power source in the form of a battery within a tubular outer housing having a mouth-end and an end distal to the mouth-end;

at least one electrical resistance heater powered by said electrical power source;

**a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw, the controller comprising a sensor adapted for sensing draw on the smoking article by a user; and**

a rod-shaped carrier device removably engaged with the mouth-end of the tubular outer housing and comprising a cartridge providing a liquid storage compartment containing a mixture comprising a tobacco extract comprising nicotine and an aerosol-forming material selected from glycerin, propylene glycol, or a mixture thereof, the mixture absorbed within an absorbent wicking material, the cartridge having a generally tubular shape and adapted for airflow therethrough;

wherein the rod-shaped carrier device is operatively positioned such that, during draw, **the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater** and volatilized to produce a visible mainstream aerosol incorporating tobacco components or tobacco-derived components that can be drawn into the mouth of the user of the smoking article.

'123 Patent, Claim 15



## The '123 Patent

### **Independent Claims 1 & 15**

**“mixture ... wicked into contact”**

“puff-actuated controller”

### Dependent Claims

“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)



# It Is Undisputed That Claims 1 & 15 Require Only That The “Mixture” Can Be “Wicked Into Contact” With The Heater

1. An electrically-powered, aerosol-generating smoking article comprising:

\* \* \*

tioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream

'123 Patent, Claim 1

15. An electrically-powered, aerosol-generating smoking article comprising:

\* \* \*

tioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream

'123 Patent, Claim 15



## Claims 1 & 15 Undisputedly Do Not Require That The Wicking Material “Contact” The Heater

### Patent Owner’s Response

RAI agrees with the Board that **claims 1 and 15 do not require that the claimed absorbent fibrous/wicking material be in contact with the heater** – rather, as the Board notes, dependent claims explicitly state that the absorbent fibrous/wicking material may be *in proximity to* the heater *or in contact with* the heater. (Paper 9 at

Patent Owner’s Response at 20-21



## The Plain Language of Claims 1 & 15 Does Not Require That The Wicking Material “Contact” The Heater

**15.** An electrically-powered, aerosol-generating smoking article comprising:

\* \* \*

tioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream

'123 Patent, Claim 15

**24.** The smoking article of claim 15, wherein the absorbent wicking material is in contact with the electrical resistance heater.

**25.** The smoking article of claim 15, wherein the absorbent wicking material is positioned in proximity to the at least one electrical resistance heater.

'123 Patent, Claims 24-25



## **The Prior Art Teaches “mixture . . . wicked into contact”**

- i. Hon teaches “wicking” the liquid “into contact” with the heater**
  
- ii. A POSA would combine Hon with Whittemore, which undisputedly “wicks” liquid “into contact” with the heater**



## The '123 Patent

### Independent Claims 1 & 15

“mixture ... wicked into contact”

Hon

Hon + Whittemore

“puff-actuated controller”

### Dependent Claims

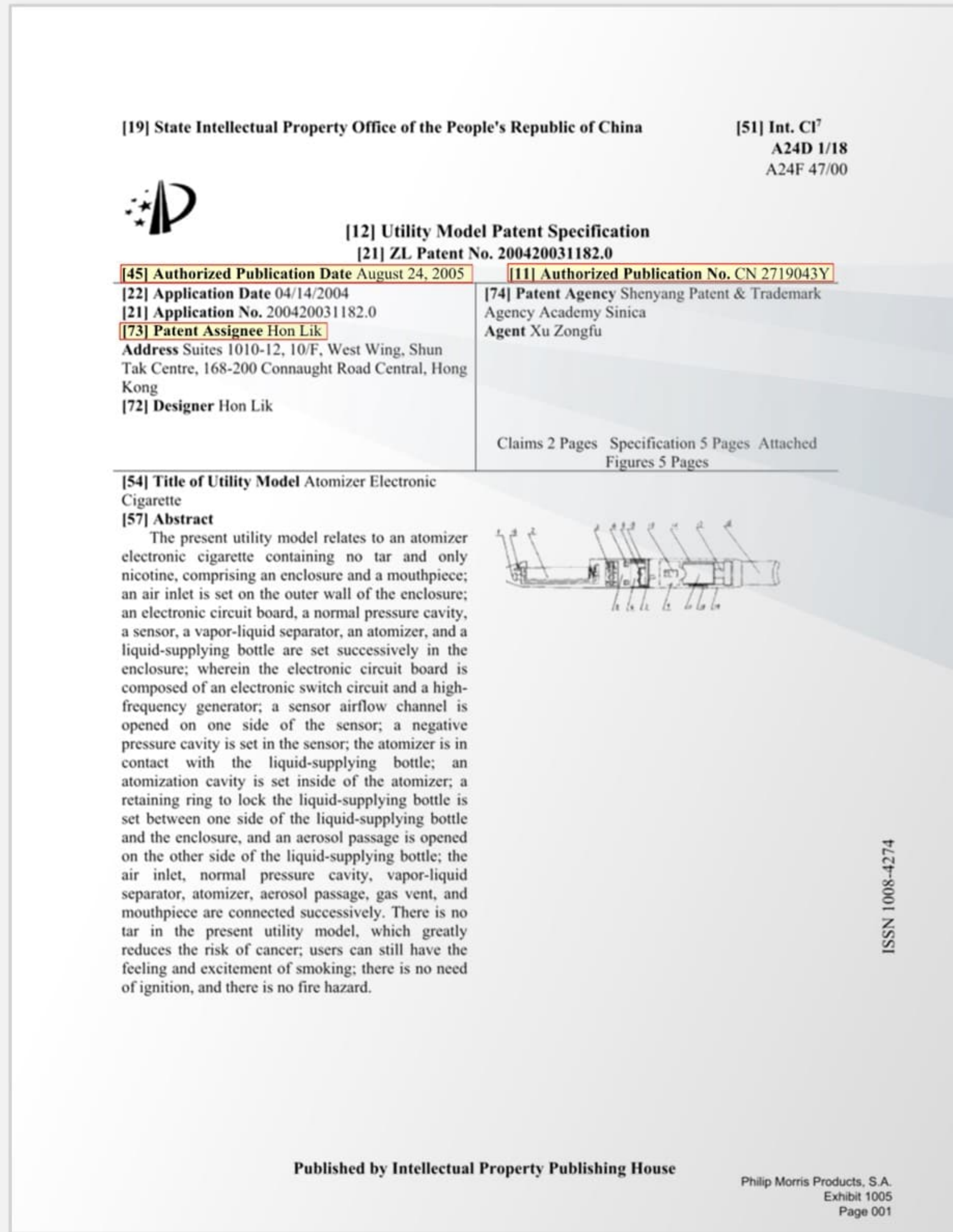
“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)



# Hon (Ex. 1005)



[11] Authorized Publication No. CN 2719043Y

[45] Authorized Publication Date August 24, 2005

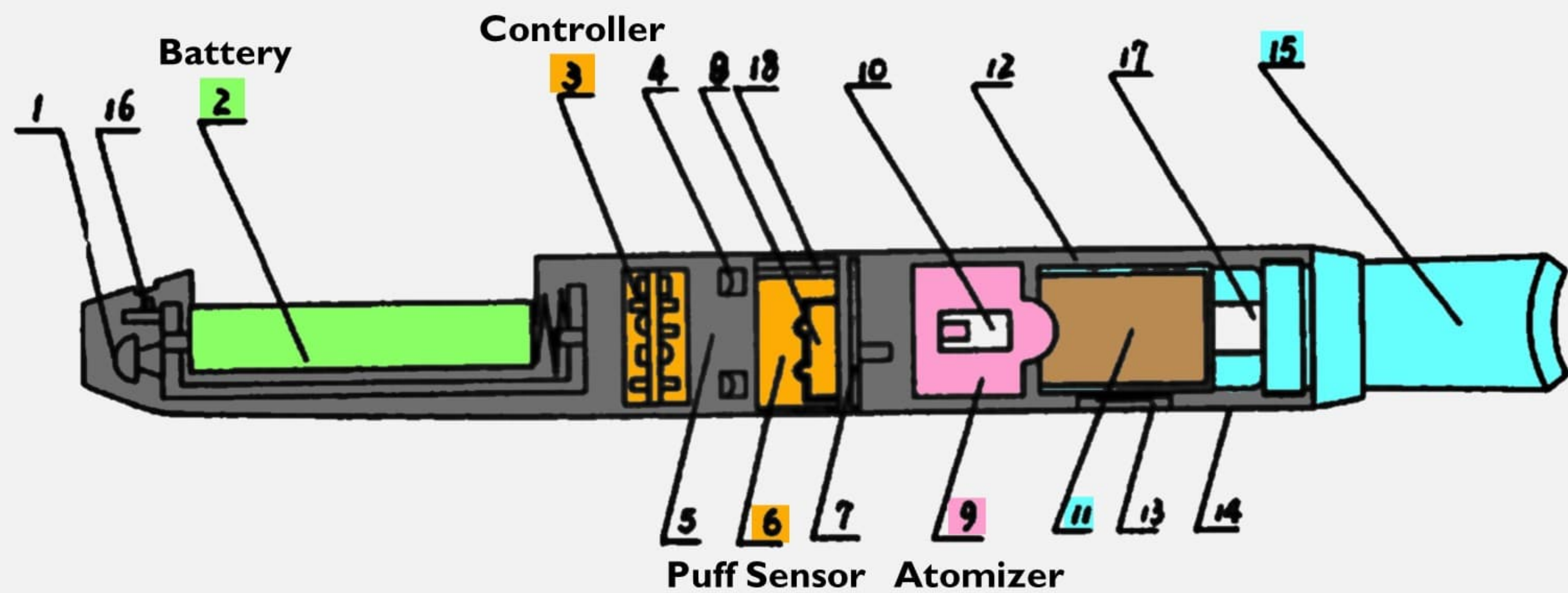
[73] Patent Assignee Hon Lik

Hon (Ex. 1005) at 1

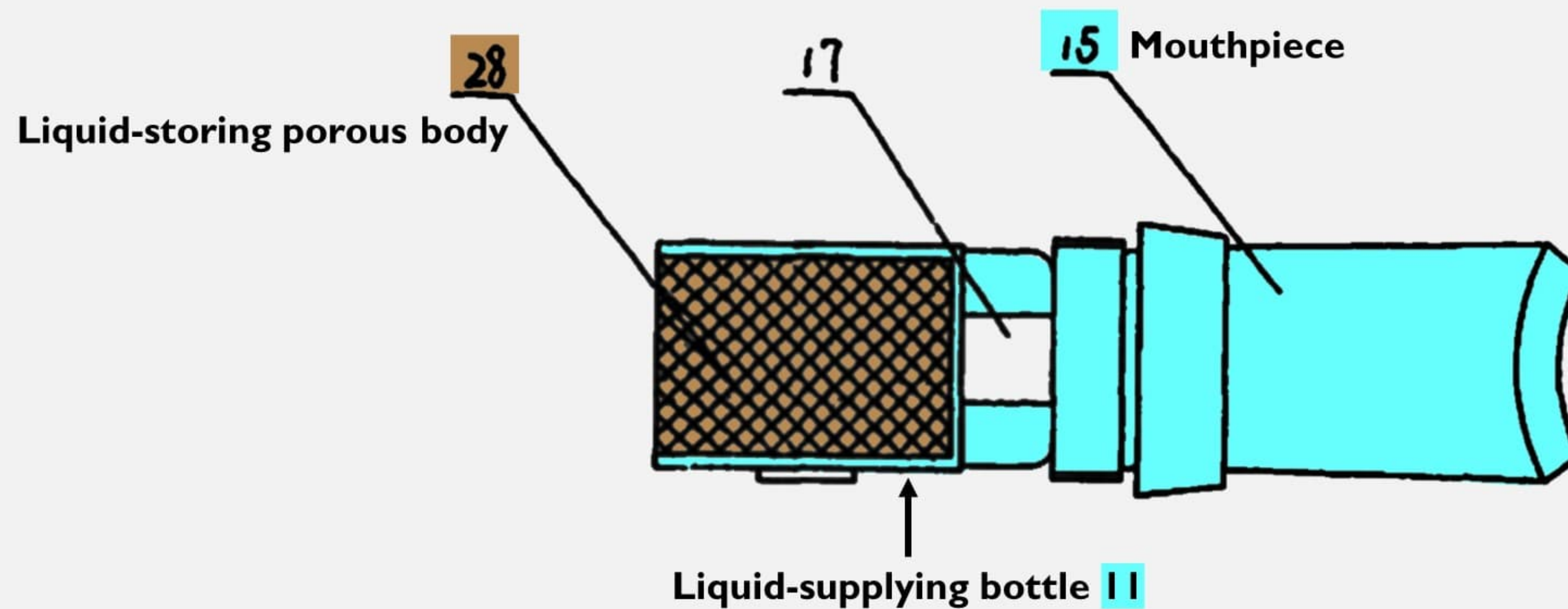


# Hon (Ex. 1005)

Hon Fig. 1



Hon Fig. 11



Hon (Ex. 1005) Figs. 1 & 11 (annotated)



# Hon (Ex. 1005)

atomizer 9 via the through hole on the vapor-liquid separator 7. The solution in the porous body 27 is driven by the high-speed airflow of the ejection hole and ejected in the form of droplets into the atomization cavity 10; it is atomized ultrasonically by the first piezoelectric element 23 and is further atomized under the effect of the heating element 26; atomized droplets of large diameters are attached to the wall under the vortex effect and are re-absorbed by the porous body 27 via the overflow hole 29; droplets of small diameters suspend in the airflow and form an aerosol, which is sucked out via the aerosol passage 12, gas vent 17, and the mouthpiece 15. The liquid storing porous body 28 in the liquid-supplying bottle 11 is in contact with the bulge 36 on the atomizer 9 to realize the solution supply via capillary infiltration.

Hon (Ex. 1005) at 7

set in the sensor 6; the second magnet 21 is fixated on the ripple film 22. The atomizer 9 is in contact with the liquid-supplying bottle 11 via a bulge 36; an atomization cavity 10 is set inside of the atomizer 9. As shown in Figures 6 and 7, an overflow hole 29 is opened on the atomization cavity wall 25 of the atomization cavity 10; a heating element 26 is set in the cavity; it may be made of platinum wires, nichrome, or iron-chromium-aluminum alloy wires containing rare earth elements, and it may also be made into a sheet. An ejection hole is opened on one side directly opposite to the heating element 26; the ejection hole may be a long stream ejection hole 24 or a short stream ejection hole 30 according to the material of the atomization cavity wall 25. The long stream ejection hole 24 may use a 0.1mm-1.3mm slit structure or a single-hole or multi-hole structure with  $\phi$  0.2mm-1.3mm hole(s); the diameter of the short stream ejection hole 30 is 0.3mm-1.3mm. A porous body 27 is wrapped around the atomization cavity wall 25, and [the porous body] may be made of nickel foam, stainless steel fiber felt, high molecular polymeric foam, and ceramic foam. A first piezoelectric element 23 is set on one side of the atomizer 9;

Hon (Ex. 1005) at 6



# Hon's Liquid Is "wicked into contact" With The Heater

## Institution Decision

On this record, we find that Petitioner sufficiently shows that Hon discloses "during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized," as claims 1 and 15 recite. First, we agree

\* \* \*

aerosol." *Id.* Therefore, based on the current record, we find that Hon teaches wicking material (porous body 27) in close proximity to the heater (heating element 26), wherein liquid is wicked into contact with the heater through ejection hole 24 when air is drawn through the smoking article.

Institution Decision at 23 & 24



# Hon's Liquid Is "wicked into contact" With The Heater

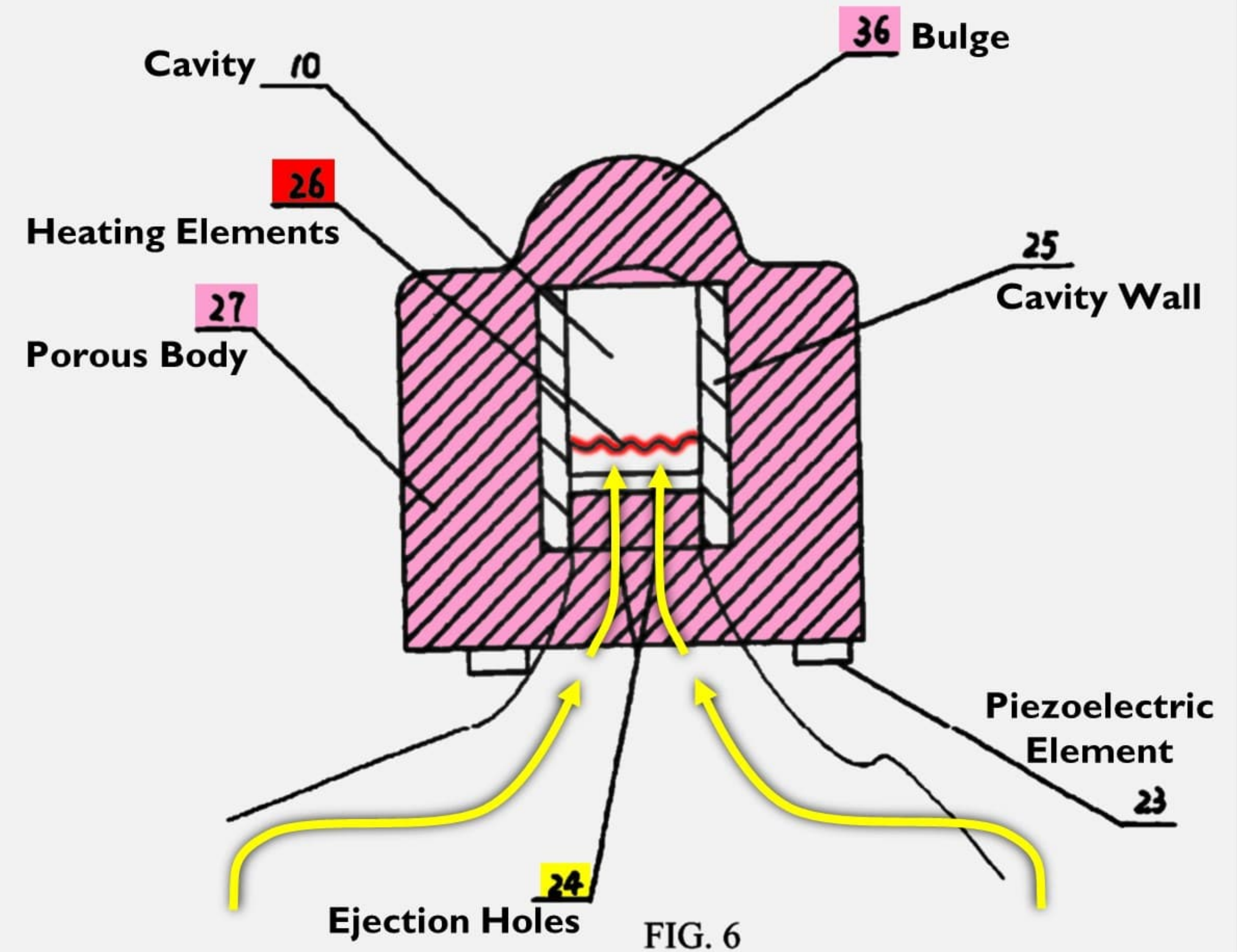
## Petition

Starting with Hon alone, Hon's atomizer wicks the liquid from bottle 11 to the heater as follows: "The liquid storing porous body 28 in the liquid-supplying bottle 11 is in contact with the bulge 36 on the atomizer 9 to realize the solution supply via capillary infiltration," i.e., wicking the solution out of the bottle. Hon at 7; Fox Decl. ¶¶ 151-152. The liquid mixture is wicked from the bottle 11 to the bulge 36 in porous body 27, and is then further wicked around and through the porous body 27 "wrapped around the atomization cavity wall 25" to ejection holes 24.

\* \* \*

1/15[d] above. During the user's draw, the wicked liquid mixture contacts the heating element—" [t]he solution in the porous body 27 is driven by the high-speed airflow ... and ejected in the form of droplets into the atomization cavity 10," where it contacts "heating element 26" and is volatilized. Hon at 7; Fox Decl. ¶ 153.

Petition at 47-48



Hon (Ex. 1005) Fig. 6 (annotated, yellow arrows added)



# No Dispute That Hon Teaches “wicking”

Hon

atomizer 9 via the through hole on the vapor-liquid separator 7. The solution in the porous body 27 is driven by the high-speed airflow of the ejection hole and ejected in the form of droplets into the atomization cavity 10; it is atomized ultrasonically by the first piezoelectric element 23 and is further atomized under the effect of the heating element 26; atomized droplets of large diameters are attached to

\* \* \*

aerosol passage 12, gas vent 17, and the mouthpiece 15. The liquid storing porous body 28 in the liquid-supplying bottle 11 is in contact with the bulge 36 on the atomizer 9 to realize the solution supply via capillary infiltration.

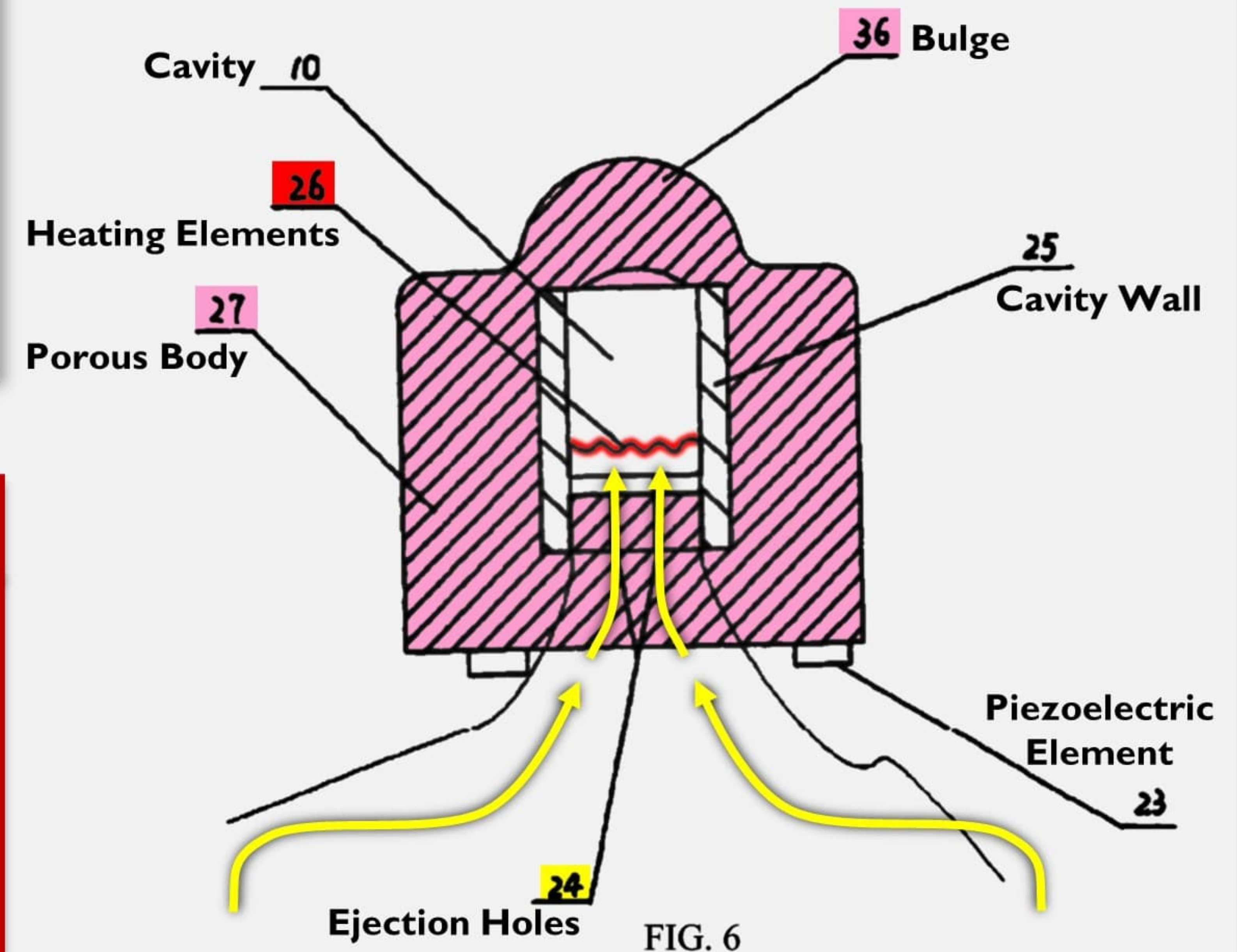
Hon (Ex. 1005) at 7

## Charles Clemens (Patent Owner’s Expert)

Q. In Hon the term “capillary infiltration” means wicking. Correct?

A. Yes, that’s fair

Clemens Tr. (Ex. 1042) at 66:12-14



Hon (Ex. 1005) Fig. 6 (annotated, yellow arrows added)



## Patent Owner Wrongly Requires The Mixture To Contact The Heater “Solely” Due To Wicking

### Patent Owner’s Response

A POSA would understand that, by their plain language (“wicked into contact”), claims 1 and 15 require the first option—“wicked so as to contact” the heater. (*Id* at ¶ 46.) This claim language **does not encompass other manners of transfer,** as those are explicitly described in the specification as *different* options.

Patent Owner’s Response at 11



## Mr. Clemens Wrongly Requires The Mixture To Contact The Heater “Solely” Due To Wicking

### Charles Clemens (Patent Owner’s Expert)

Q. Is it your opinion that the plain meaning of "wicked into contact" requires that the mixture be brought into contact with the heater **solely by wicking**?

**A. Yes. Yes, that is correct.**

Clemens Tr. (Ex. 1042) at 38:13-17



# Patent Owner And Mr. Clemens Are Wrong As A Matter Of Law

The transition “comprising” creates a presumption that . . . the claim **does not exclude** additional, unrecited elements.

*Crystal Semiconductor Corp. v. TriTech Microelectronics Int'l., Inc.*, 246 F3d 1336, 1348 (Fed. Cir. 2001)

1. An electrically-powered, aerosol-generating smoking article comprising:

\* \* \*

tioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream

'123 Patent, Claim 1

15. An electrically-powered, aerosol-generating smoking article comprising:

\* \* \*

tioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream

'123 Patent, Claim 15



# Patent Owner's Narrow Construction Contradicts Claim 25

**15.** An electrically-powered, aerosol-generating smoking article comprising:

\* \* \*

tioned such that, during draw, the mixture comprising the tobacco extract and the aerosol-forming material can be wicked into contact with the electrical resistance heater and volatilized to produce a visible mainstream

'123 Patent, Claim 15

**24.** The smoking article of claim 15, wherein the absorbent wicking material is in contact with the electrical resistance heater.

**25.** The smoking article of claim 15, wherein the absorbent wicking material is positioned in proximity to the at least one electrical resistance heater.

'123 Patent, Claims 24-25



# Hon's Liquid Contacts Its Heater

Hon

atomizer 9 via the through hole on the vapor-liquid separator 7. The solution in the porous body 27 is driven by the high-speed airflow of the ejection hole and ejected in the form of droplets into the atomization cavity 10; it is atomized ultrasonically by the first piezoelectric element 23 and is further atomized under the effect of the heating element 26; atomized droplets of large diameters are attached to the wall under the vortex effect and are re-absorbed by the porous body 27 via the overflow hole 29;

Hon (Ex. 1005) at 7

## Petition

1/15[d] above. During the user's draw, the wicked liquid mixture **contacts** the heating element—"[t]he solution in the porous body 27 is driven by the high-speed airflow ... and ejected in the form of droplets into the atomization cavity 10," where it **contacts** "heating element 26" and is volatilized. Hon at 7; Fox Decl.

¶ 153.

Petition at 48

## Stewart Fox (Petitioner's Expert)

153. When the user draws on the device, the liquid "solution in the porous body 27 is driven by the high-speed airflow ... and ejected in the form of droplets into the atomization cavity 10," where it **contacts** "heating element 26" and volatilized into an aerosol "which is sucked out via the aerosol passage 12, gas vent 17, and the mouthpiece 15." Hon at 7.

Fox Decl. (Ex. 1003) ¶ 153



# Patent Owner's Argument Is Wrong As A Matter Of Law

## Patent Owner's Sur-Reply

(Ex. 1003 at ¶ 153.) But Hon does not explicitly disclose that its liquid contacts its heating element, and both experts agree. (Ex. 1005 at 7; Ex. 2010 at ¶¶ 67, 70; Ex.

Patent Owner's Sur-Reply at 6

A reference “need not satisfy an *ipsissimis verbis* [in the identical words] test” in order to disclose a claim element.

*In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009)

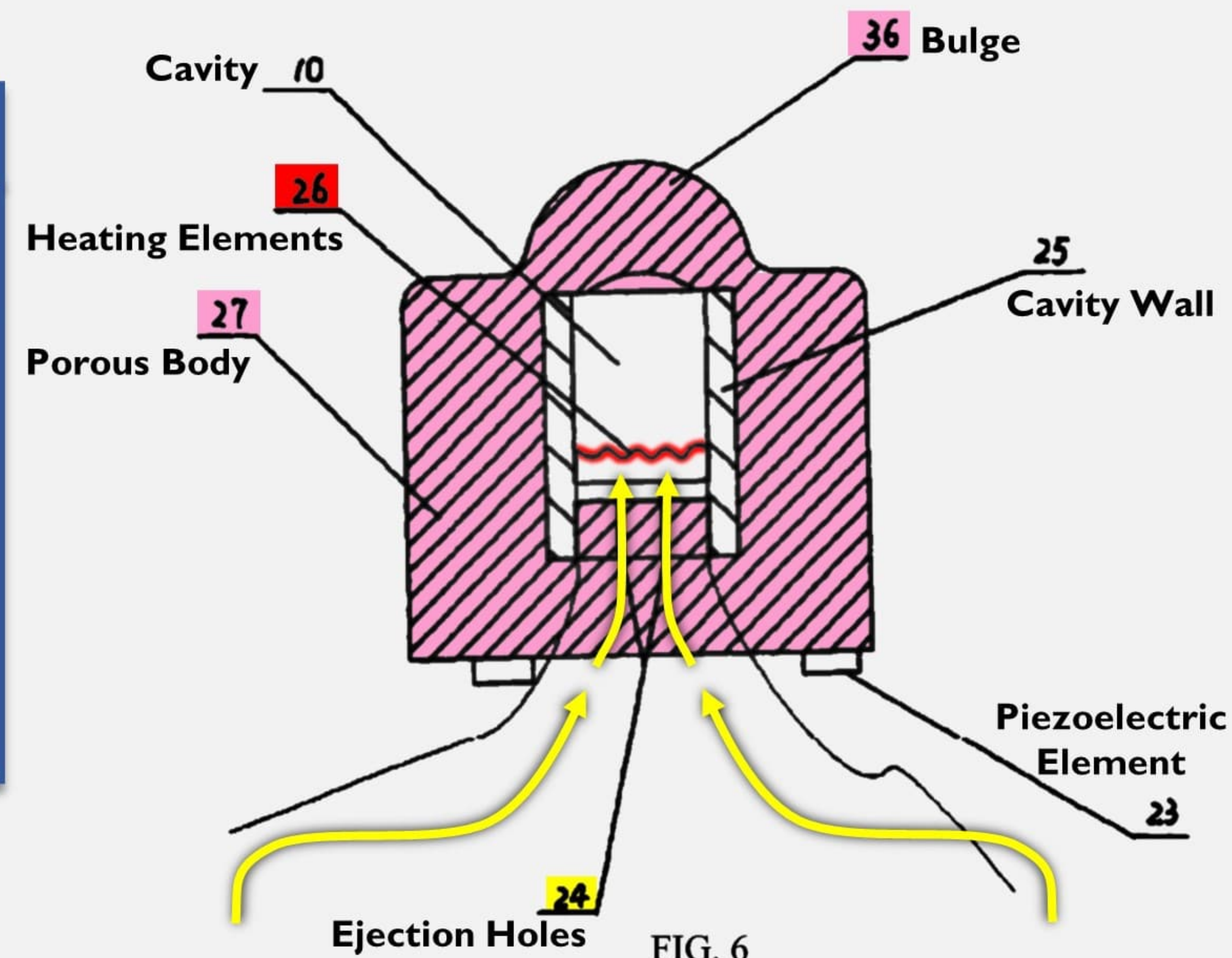


# The Petition Explains That Hon Teaches Contact

## Petition

1/15[d] above. During the user's draw, the wicked liquid mixture contacts the heating element—“[t]he solution in the porous body 27 is driven by the high-speed airflow ... and ejected in the form of droplets into the atomization cavity 10,” where it contacts “heating element 26” and is volatilized. Hon at 7; Fox Decl. ¶ 153.

Petition at 48



Hon (Ex. 1005) Fig. 6 (annotated, yellow arrows added)

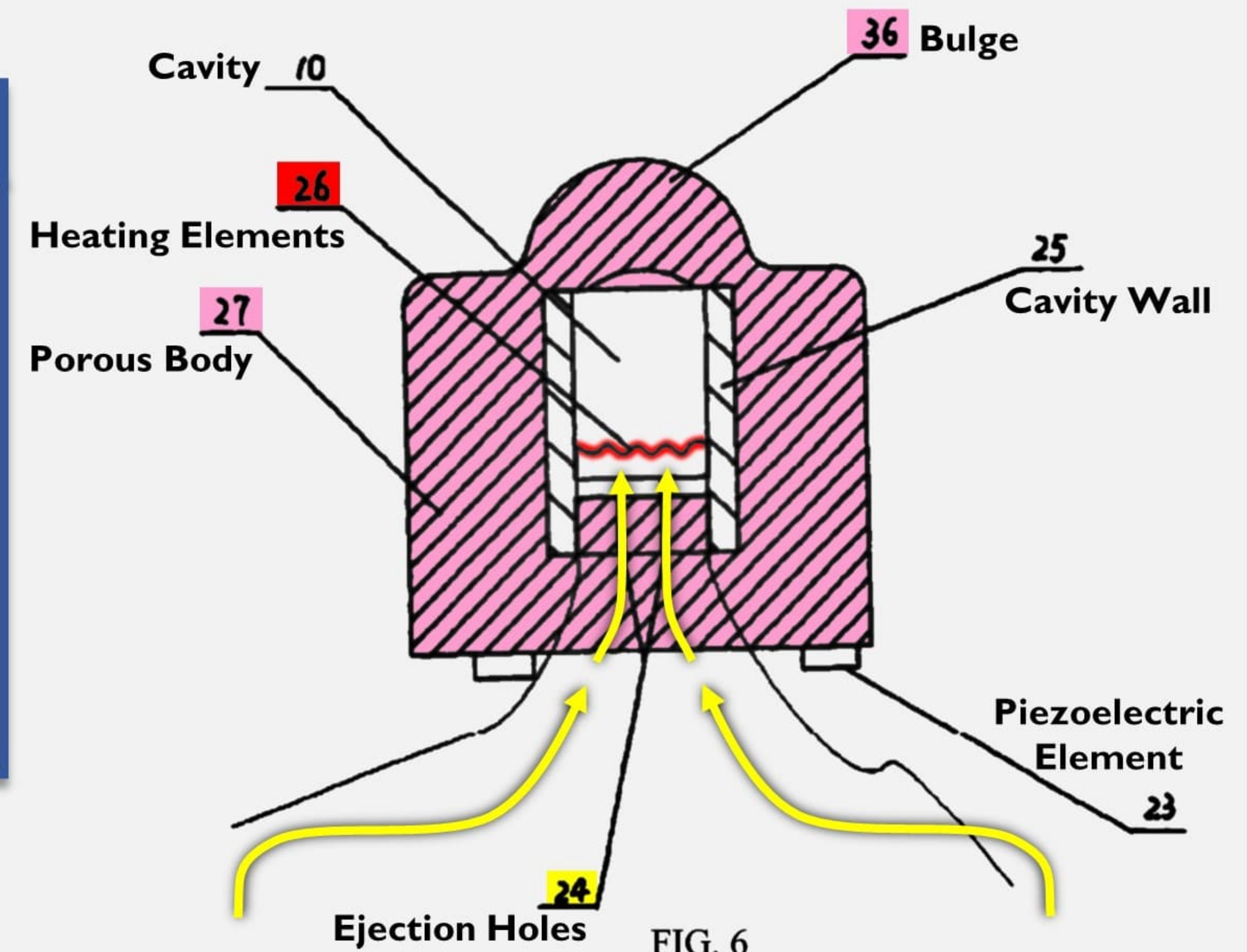


# Mr. Fox's Declaration Explains That Hon Teaches Contact

## Stewart Fox (Petitioner's Expert)

153. When the user draws on the device, the liquid “solution in the porous body 27 is driven by the high-speed airflow ... and ejected in the form of droplets into the atomization cavity 10,” where it contacts “heating element 26” and volatilized into an aerosol “which is sucked out via the aerosol passage 12, gas vent 17, and the mouthpiece 15.” Hon at 7.

Fox Decl. (Ex. 1003) ¶ 153



Hon (Ex. 1005) Fig. 6 (annotated, yellow arrows added)



# Patent Owner Misrepresents Mr. Fox's Testimony

## Patent Owner's Response

heating element 26.” (Ex. 1005 at 7.) During his deposition, Mr. Fox conceded that Hon does not describe that the liquid contacts the heater. (Ex. 2011 at 94:22-95:8.)

Patent Owner's Response at 25

## Stewart Fox (Petitioner's Expert)

Q. The Hon patent in the four corners of that document doesn't disclose that the material is reaching the heating element in liquid form, correct?

A. **A person -- a POSA reading the Hon patent, it would be -- it would be obvious to them that the liquid is ejected out of the holes and strikes the heater in liquid form for it to be vaporized by the heater before it reaches the heater.**

Fox Tr. (Ex. 2011) at 94:22-95:8 (objection omitted)



# Patent Owner Misrepresents Mr. Fox's Testimony

## Stewart Fox (Petitioner's Expert)

Q. In your declaration, you don't cite any evidence that the liquid actually contacts the heating in liquid form, correct?

A. **In my declaration, I said, in the context of the '123 patent, Hon does teach that the liquid is wicked onto the heater, which -- into contact with the heater, and a person of ordinary skill in the art would understand that it reaches the heater in liquid form.**

Fox Tr. (Ex. 2011) at 95:19-96:3



# Patent Owner Misrepresents Mr. Fox's Testimony

## Stewart Fox (Petitioner's Expert)

Q. Now, the Hon patent never discloses that any liquid actually contacts the heating element in liquid form, correct?

A. **A person of ordinary skill in the art would look at the specification in Hon and figure 6, and the specification states that a long stream ejection hole is opened on one side of the heating element. I recall it also says somewhere, but I can't find the exact reference, that the ejection hole is directly opposite the heating element. So with that information and looking at figure 6, a POSA will understand that the liquid is ejected out of the holes directly onto the heating element, where it would be vaporized and then form an aerosol.**

Fox Tr. (Ex. 2011) at 94:5-21 (objection omitted)



# Patent Owner Misrepresents Mr. Fox's Testimony

## Stewart Fox (Petitioner's Expert)

Q. You do not have quotes in paragraph 153 around the phrase "where it contacts" because that phrase doesn't appear in the Hon patent, correct?

A. **A person of ordinary skill in the art reading the Hon patent and looking at figure 6 would understand that that is how the device works, the liquid is ejected in the form of droplets and it contacts the heating element.**

Fox Tr. (Ex. 2011) at 98:5-13



# Patent Owner Misrepresents Mr. Fox's Testimony

## Stewart Fox (Petitioner's Expert)

Q. So you agree with me, Mr. Fox, that the Hon text doesn't say that the liquid reaches the heater in liquid form, but your opinion is that a person of skill in the art reading Hon would understand that that's what happens, correct?

\* \* \*

A. ... A person of ordinary skill in the art reading Hon **would understand and would interpret that the liquid is wicked into contact with the heater and reaches the heater in liquid form.**

Fox Tr. (Ex. 2011) at 95:4-16 (objection omitted)



# Patent Owner Misrepresents Mr. Fox's Testimony

## Stewart Fox (Petitioner's Expert)

Q. So what Hon is disclosing here and what you're quoting in paragraph 75 is that the liquid that's in the porous body is driven out of the porous body through the ejection hole and into the atomization chamber by the high-speed airflow that's created when the user takes a draw on the device, correct?

\* \* \*

A. ... **a POSA would understand that the liquid exits the ejection holes, or leaves the porous body, strikes the heater, where it is vaporized, and then condenses shortly afterwards to form an aerosol.** Fox Tr. (Ex. 2011) at 84:12-20 (objection omitted)



# Patent Owner's "No Contact" Argument Contradicts Hon

## Charles Clemens (Patent Owner's Expert)

Q. Your opinion is that all of the droplets in Hon are likely to vaporize when they enter the atomization chamber before they contact the heater.

A. Yes. I think that's -- that's correct.

Clemens Tr. (Ex. 1042) at 82:6-10

Hon

atomizer 9 via the through hole on the vapor-liquid separator 7. The solution in the porous body 27 is driven by the high-speed airflow of the ejection hole and ejected in the form of droplets into the atomization cavity 10; it is atomized ultrasonically by the first piezoelectric element 23 and is further atomized under the effect of the heating element 26; atomized droplets of large diameters are attached to the wall under the vortex effect and are re-absorbed by the porous body 27 via the overflow hole 29;

Hon (Ex. 1005) at 7



# Patent Owner's "No Contact" Argument Contradicts Hon

## Charles Clemens (Patent Owner's Expert)

Q. Your opinion is that all of the droplets in Hon are likely to vaporize when they enter the atomization chamber before they contact the heater.

A. **Yes. I think that's -- that's correct.**

Clemens Tr. (Ex. 1042) at 82:6-10

## Charles Clemens (Patent Owner's Expert)

Q. In Hon, liquid droplets hit the wall of the ceramic inside the atomization chamber. Right?

A. **Some of the larger ones, yes.**

Q. So we know that some liquids can form and persist inside the atomization chamber in Hon.

A. **That is correct**, some droplets of -- that are not breathable, he is stating walls, and then drop into this hole.

Clemens Tr. (Ex. 1042) at 92:17-93:3

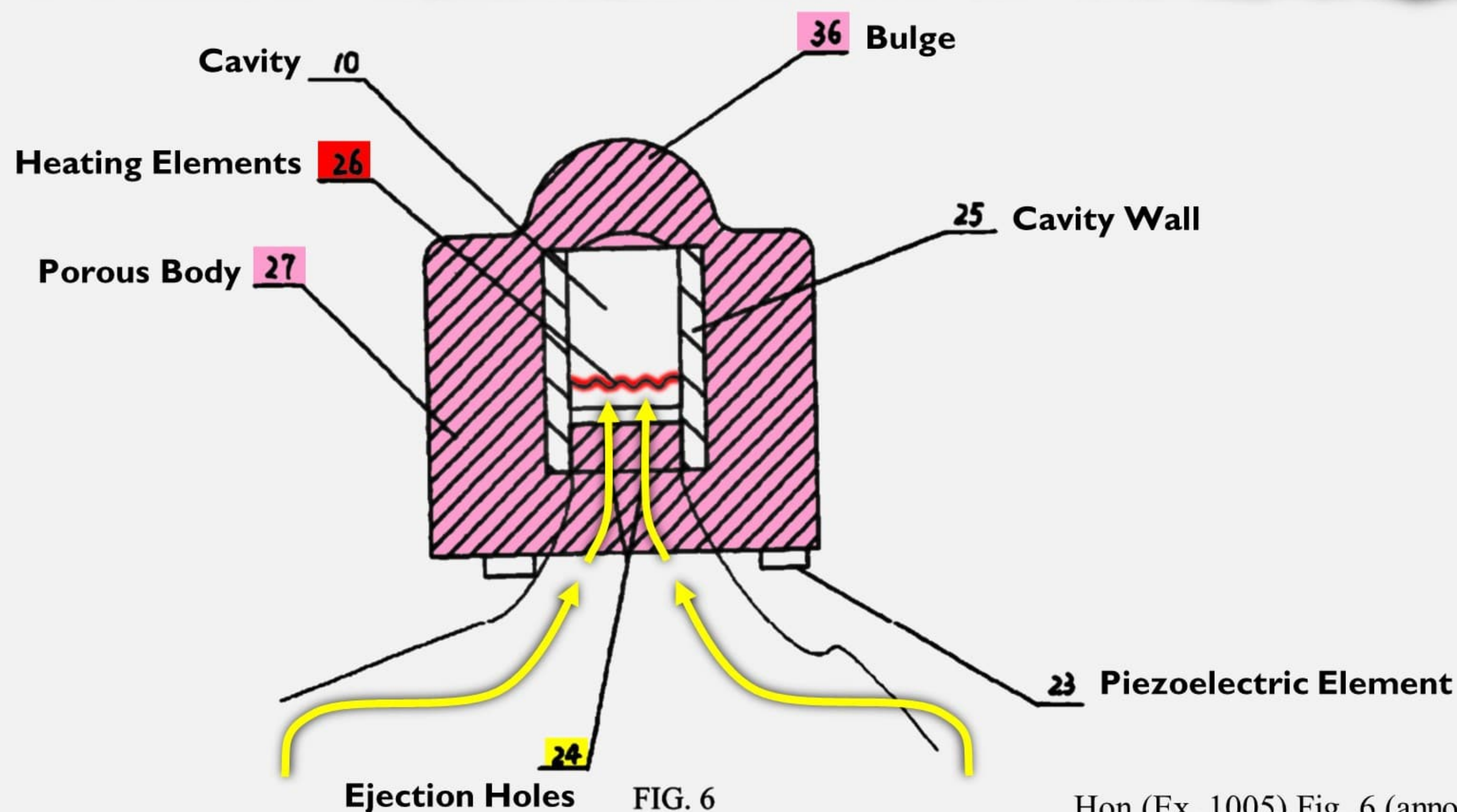


# Patent Owner's "No Contact" Argument Contradicts Hon

Hon

atomizer 9 via the through hole on the vapor-liquid separator 7. The solution in the porous body 27 is driven by the high-speed airflow of the ejection hole and ejected in the form of droplets into the atomization cavity 10; it is atomized ultrasonically by the first piezoelectric element 23 and is further atomized under the effect of the heating element 26; atomized droplets of large diameters are attached to the wall under the vortex effect and are re-absorbed by the porous body 27 via the overflow hole 29;

Hon (Ex. 1005) at 7



Hon (Ex. 1005) Fig. 6 (annotated, yellow arrows added)



## The '123 Patent

### **Independent Claims 1 & 15**

**“mixture ... wicked into contact”**

Hon

**Hon + Whittemore**

“puff-actuated controller”

### **Dependent Claims**

“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)



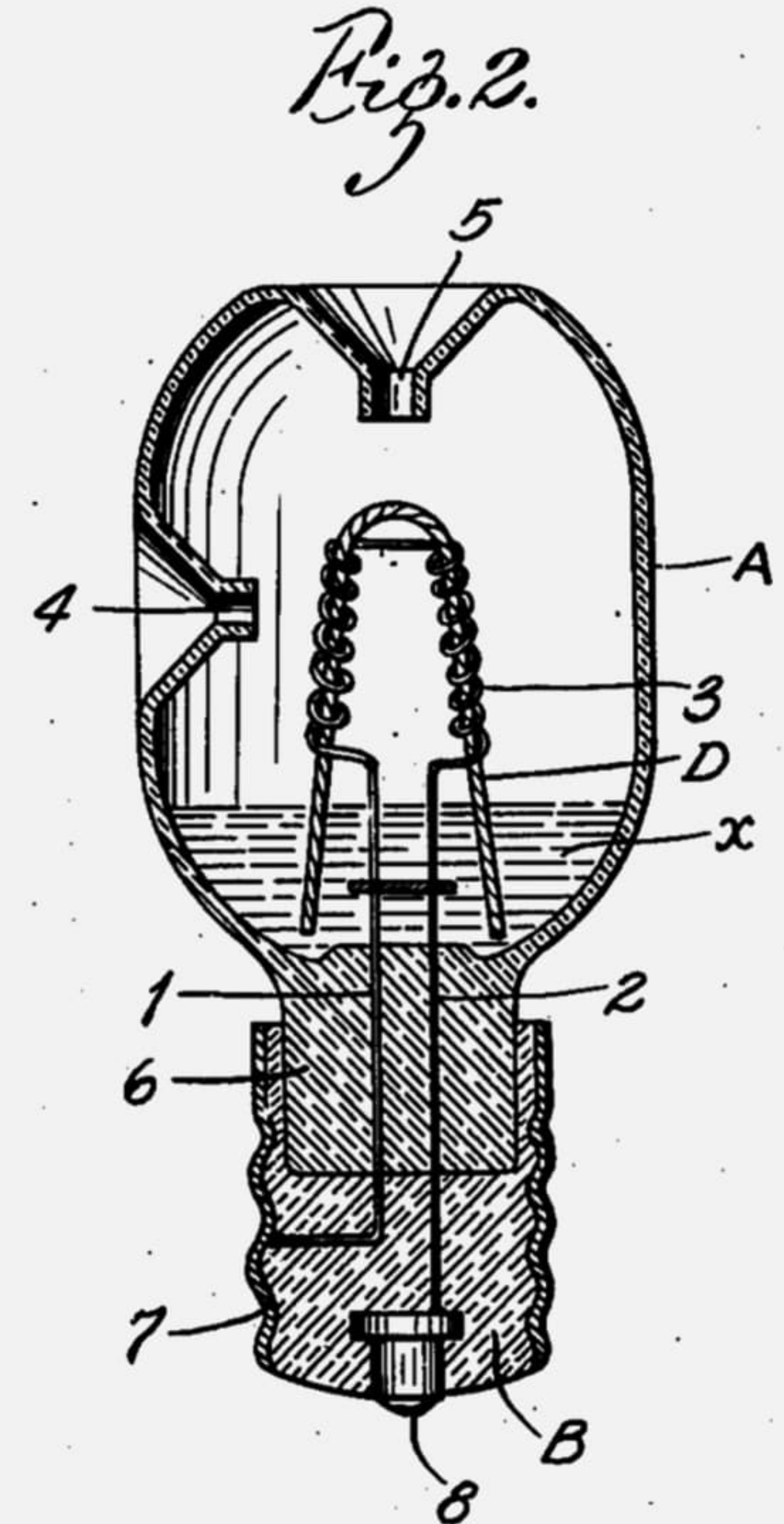
# Whittemore (Ex. 1007)

VAPORIZING UNIT FOR THERAPEUTIC APPARATUS

2,057,353

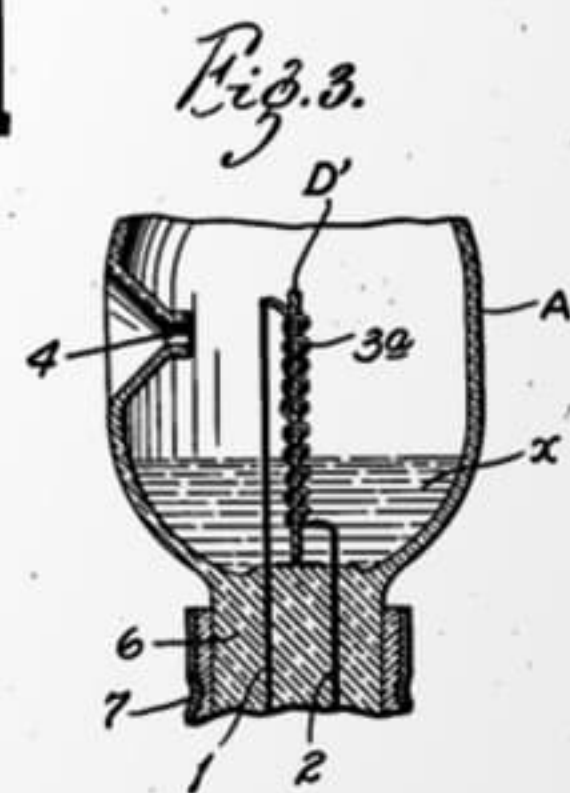
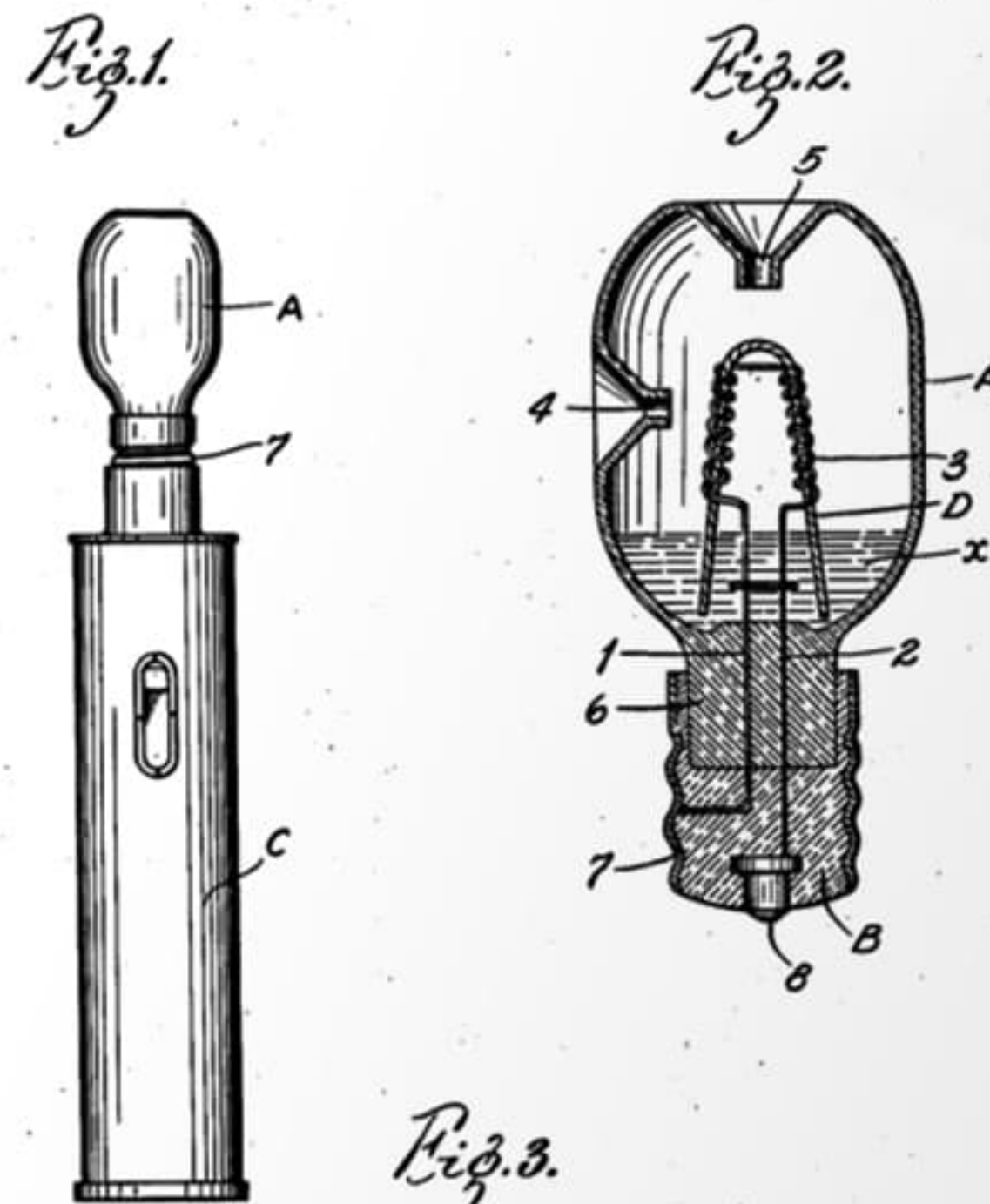
Filed Sept. 27, 1935

C. L. WHITTEMORE, JR.



Whittemore (Ex. 1007) Fig 2

Oct. 13, 1936. C. L. WHITTEMORE, JR. 2,057,353  
VAPORIZING UNIT FOR THERAPEUTIC APPARATUS  
Filed Sept. 27, 1935

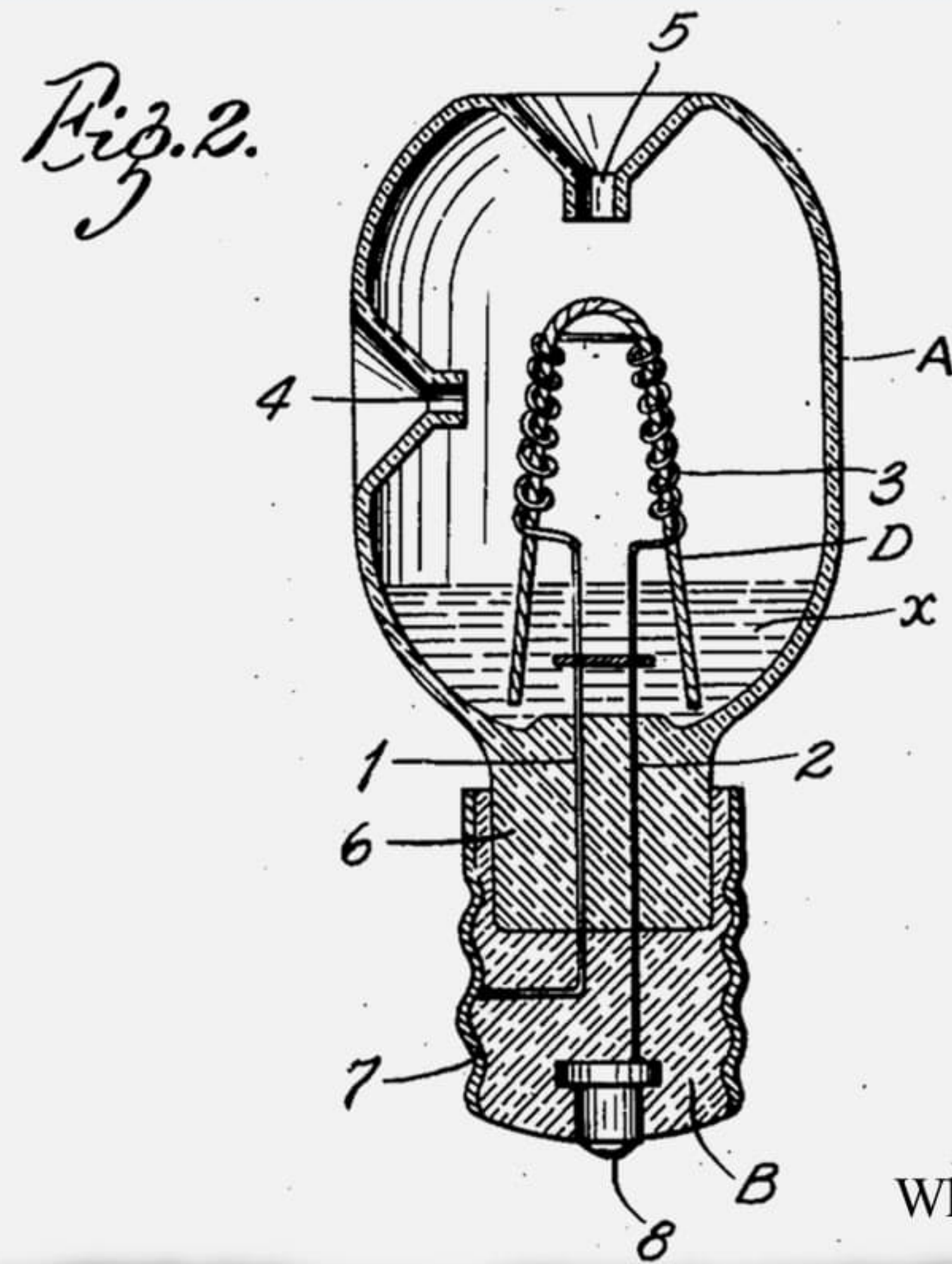


INVENTOR  
CLINTON L. WHITTEMORE, JR.  
BY *Robert L. Chas.*  
ATTORNEYS

Philip Morris Products, S.A.  
Exhibit 1007  
Page 001



# Whittemore Undisputedly Teaches A “mixture . . . wicked into contact”



Whittemore (Ex. 1007) Fig 2

such a way that a portion of said wick is always in contact or approximate contact with the heating element or filament 3, and a portion of said wick is always in contact with the medicament in the vaporizing vessel, whereby said medicament will be carried by capillary action to a point where it will be vaporized by the heat from the filament 3. In the form of my invention

Whittemore (Ex. 1007) at 2:1-8

## Charles Clemens (Patent Owner's Expert)

Q. Whittemore discloses **wicking the liquid into contact** with an electrical resistance heater.

A. That is what the -- yeah, the specification indicates.

\* \* \*

Q. Whittemore discloses **wicking the liquid into contact** with the electrical resistance heater by placing the wick in contact with the heater.

A. That -- yeah, that is what it is indicating.

Clemens Tr. (Ex. 1042) at 25:20-1, 26:5-9



# A POSA Would Implement Whittemore's Wick/Heater in Hon

## Petition

A POSA would have been motivated to implement Hon's device by replacing its complicated piezoelectric atomizer with a simpler and cheaper heater and wick (such as Whittemore's) to reduce design costs and effort, reduce manufacturing costs including parts and assembly, increase reliability, and increase the expectation of success. Fox Decl. ¶¶ 158-168.

Petition at 50-51



## **A POSA Would Implement Whittemore's Wick/Heater in Hon**

- 1) '123 Patent admits selection of a heating element was admittedly “readily apparent” to a POSA**
- 2) Whittemore's wick/heater was well understood**
- 3) Whittemore's wick/heater was cheaper than Hon's atomizer**
- 4) Hon, itself, suggests to “simplify” its design**



# 1) '123 Patent Admits Selection Of A Heating Element Was "Readily Apparent" As A "Matter Of Design Choice"

US009901123B2

(12) **United States Patent**  
**Robinson et al.** (10) **Patent No.:** US 9,901,123 B2  
 (45) **Date of Patent:** \*Feb. 27, 2018

(54) **TOBACCO-CONTAINING SMOKING ARTICLE** (58) **Field of Classification Search**  
 None  
 See application file for complete search history.

(71) **Applicant:** RAI STRATEGIC HOLDINGS, INC.,  
 Winston-Salem, NC (US)

(72) **Inventors:** John Howard Robinson, Kernersville,  
 NC (US); David William Griffith, Jr.,  
 Winston-Salem, NC (US); Billy Tyrone  
 Conner, Clemmons, NC (US); Evon  
 Llewellyn Crooks, Mocksville, NC  
 (US); Dempsey Bailey Brewer, Jr.,  
 East Bend, NC (US)

(73) **Assignee:** RAI Strategic Holdings, Inc.,  
 Winston-Salem, NC (US)

(\* ) **Notice:** Subject to any disclaimer, the term of this  
 patent is extended or adjusted under 35  
 U.S.C. 154(b) by 0 days.  
 This patent is subject to a terminal dis-  
 claimer.

(21) **Appl. No.:** 15/286,087

(22) **Filed:** Oct. 5, 2016

(65) **Prior Publication Data**  
 US 2017/0020200 A1 Jan. 26, 2017

**Related U.S. Application Data**

(63) Continuation of application No. 14/527,287, filed on  
 Oct. 29, 2014, which is a continuation of application  
 (Continued)

(51) **Int. Cl.**  
 A24F 1/00 (2006.01)  
 A24F 47/00 (2006.01)  
 (Continued)

(52) **U.S. CL**  
 CPC ..... A24F 47/008 (2013.01); A24B 13/02  
 (2013.01); A24B 15/12 (2013.01); A24B  
 15/167 (2016.11);  
 (Continued)

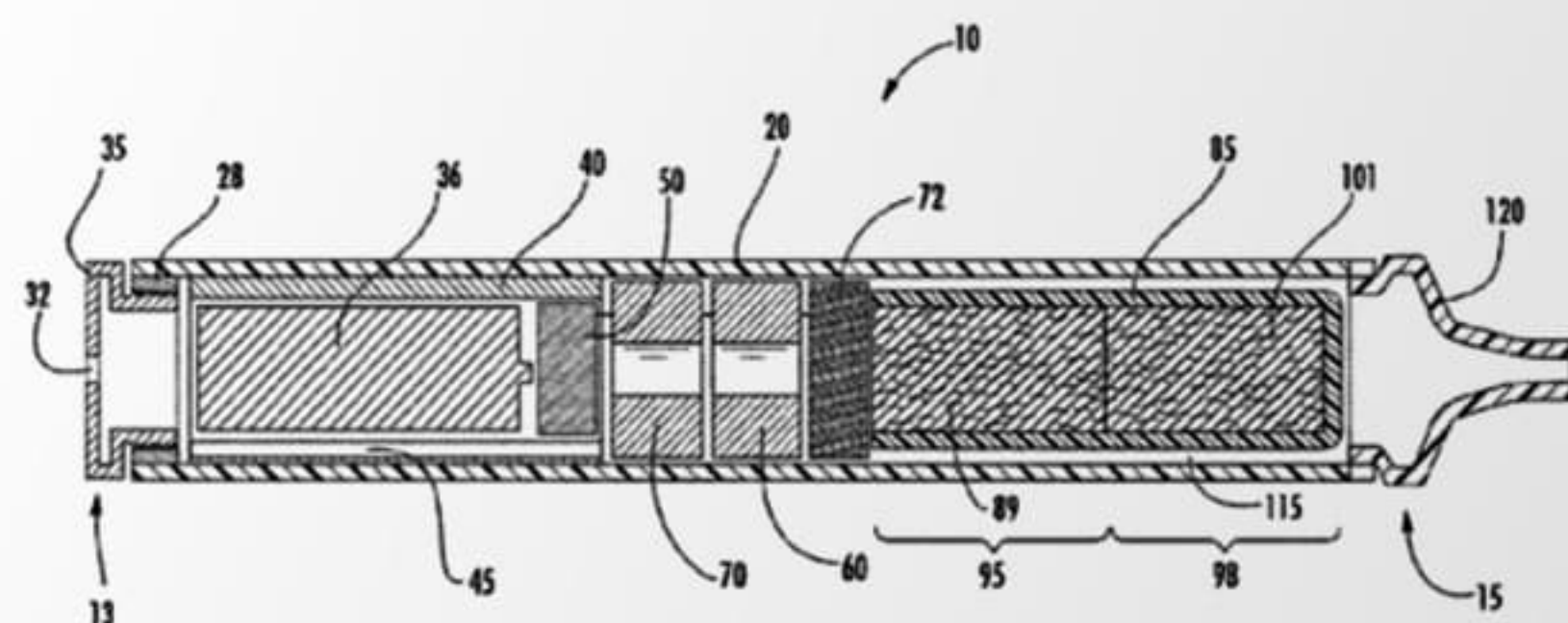
(56) **References Cited**  
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 (Continued)

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 (Continued)

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 Lu, Zhang, "Safe Substitute", China Daily, Jul. 11, 2005.  
 (Continued)

*Primary Examiner* — Michael H Wilson  
*Assistant Examiner* — Phu Nguyen  
 (74) *Attorney, Agent, or Firm* — Womble Bond Dickinson  
 (US) LLP

(57) **ABSTRACT**  
 A smoking article may include a cigarette incorporated  
 within an electrically powered aerosol generating device that  
 acts as a holder for that cigarette. The smoking article  
 possesses at least one form of tobacco. The smoking article  
 also possesses a mouth-end piece that is used by the smoker  
 to inhale components of tobacco that are generated by the  
 action of heat upon components of the cigarette. A repre-  
 sentative smoking article possesses an outer housing incor-  
 porating a source of electrical power (e.g., a battery), a  
 sensing mechanism for powering the device at least during  
 periods of draw, and a heating device (e.g., at least one  
 electrical resistance heating element) for forming a ther-  
 mally generated aerosol that incorporates components of  
 tobacco. During use, the cigarette is positioned within the  
 (Continued)



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 Exhibit 1001  
 Page 001

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For all the embodiments described above, the selection of battery and resistance heating elements can vary, and can be a matter of design choice. For example, the battery voltage,

\* \* \*

does not overheat). Selection of the power source and resistance heating elements can be a matter of design choice, and will be readily apparent to one skilled in the art of design and manufacture of electrical resistance heating systems.

'123 Patent at 29:32-34, 47-50



## 2) Whittemore's Wick/Heater Was Well Understood

Filed Sept. 27, 1935

Oct. 13, 1936. C. L. WHITTEMORE, JR. 2,057,353

VAPORIZING UNIT FOR THERAPEUTIC APPARATUS

Filed Sept. 27, 1935

Fig. 1.

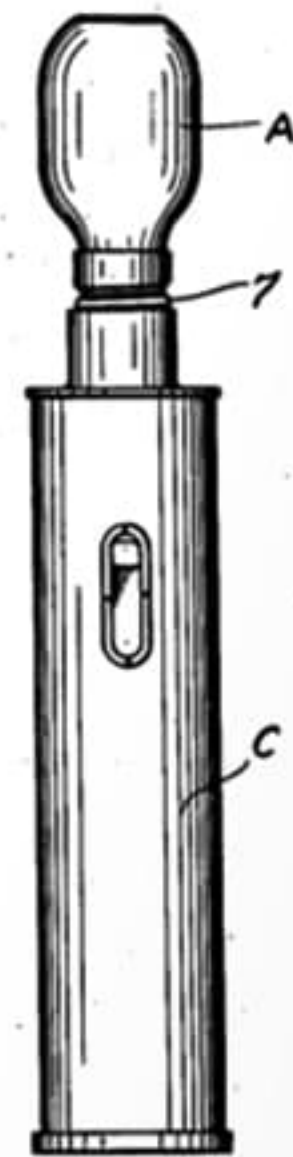


Fig. 2.

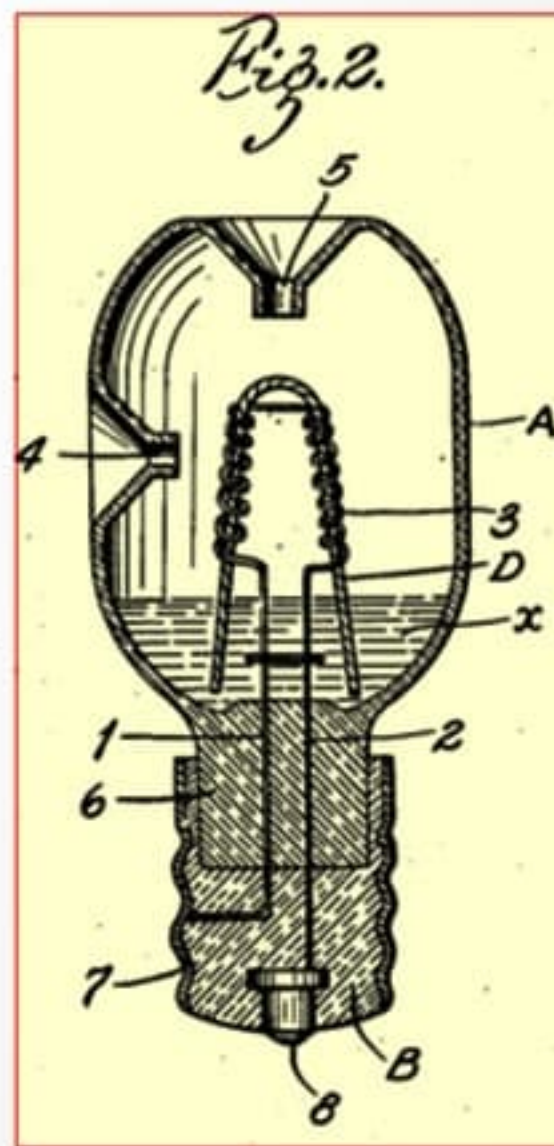
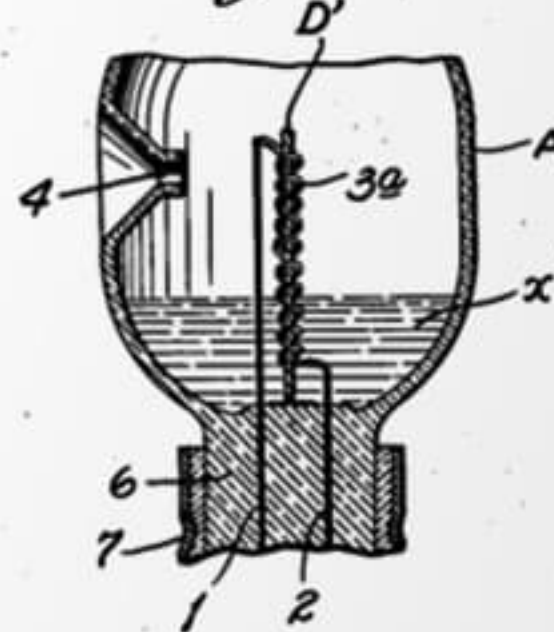


Fig. 3.



INVENTOR  
CLINTON L. WHITTEMORE, JR.  
BY *Robert L. Chubb*  
ATTORNEYS

Philip Morris Products, S.A.  
Exhibit 1007  
Page 001

### Charles Clemens (Patent Owner's Expert)

- Q. So it's fair to say that it's been known since at least 1935 in the art to create a vaporizing unit by placing a wick into contact with an electrical resistance heater.
- A. I would say that that is correct. In -- in the idea that, you know, wicking liquid into contact with a -- with, you know, the heater, is -- you know, is understood in this time frame, correct.

Clemens Tr. (Ex. 1042) at 28:16-29:2



## 2) Whittemore's Wick/Heater Was Well Understood

### Stewart Fox (Petitioner's Expert)

161. On the other hand, wicks have long been well understood, so choosing an appropriate wick (e.g., size and material), heater, and physical arrangement (to ensure the wick is inserted into and in good contact with the fibrous/wicking material inside of Hon's bottle to ensure good capillary action out of the bottle) would have been well within a POSA's skill—and drastically simplified optimization of the design. As a result, a POSA would have had a reasonable

Fox Decl. (Ex. 1003) ¶ 161



### 3) Whittemore's Wick/Heater Was Cheaper Than Hon's Atomizer

#### Charles Clemens (Patent Owner's Expert)

Q. Whittemore's heating element is a wire. Correct?

A. **I believe they referred to it as a filament, but I get your meaning. I'll say, yes, that's fair.**

Q. Whittemore's wick is a string or a thread. Correct?

A. **Yes.**

Clemens Tr. (Ex. 1042) at 116:13-20

Q. A thread is not an expensive component. Right?

A. **Right. A thread, just thread alone, common thread, is not expensive.**

Q. A piezoelectric transducer is a more expensive component than a thread. Right?

A. **Yes, I think that's fair.**

Q. A porous body in a ceramic wall costs more as parts than a thread. Correct?

A. **Sure, I'll buy that.**

Clemens Tr. (Ex. 1042) at 117:14-118:1



## 4) Hon Suggests To “simplify the design” To Rely Only On A Heating Element

To simplify the design, the first piezoelectric element 23 on the atomizer 9 may be removed, and the atomization of the solution relies only on the heating element 26. The size of the atomizer may be smaller,

Hon (Ex. 1005) at 7

### Petition

With that in mind, a POSA implementing Hon would have ensured that a sufficient amount of liquid is volatilized by the heater *and* further simplified the device’s mechanical design and manufacture by simply replacing Hon’s atomizer with a tried-and-true and well-understood wick/heater design such as that in Whittemore’s vaping device. Fox Decl. ¶¶ 159-168 (also explaining that a wick-based system like Hon’s is easier to optimize and manufacture); *see also* Ex. 1023

Petition at 52



## 4) Patent Owner Mischaracterizes Hon's Suggestion to "simplify"

### Patent Owner's Response

Thus, even if a POSA had been motivated to simplify Hon's device, a POSA would not have had to look beyond Hon itself to understand that she could have removed the piezoelectric element 23 and continued to use a very similar atomizer. (Ex. 2010

Patent Owner's Response at 36

"[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine"

*Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016)



## 4) A POSA Would Go Beyond Removing The Piezoelectric Element To “Simplify”

### Stewart Fox (Petitioner’s Expert)

165. Similarly, RJR did not report a piezoelectric element or associated circuitry in its 2006 tear down report. RJR did not analyze the circuitry because it

\* \* \*

low level of background heat. Accordingly, a POSA reading Hon would have concluded that the Ruyan device analyzed in 2006 may have had a piezoelectric element, but if it did, it was inoperable. As with the device analyzed by PMUSA,

\* \* \*

166. Accordingly, a POSA would have taken Hon’s invitation to eliminate the piezoelectric device and associate circuitry because it adds significant complexity but is not reliable (or otherwise unhelpful) in production devices.

167. A POSA would have also understood that the lack of observable piezoelectric effect may have further contributed to the device’s observed poor performance (i.e., need for a longer and slower draw to generate the desired amount of aerosol). This would have further encouraged a POSA to abandon Hon’s atomizer design (with or without a piezoelectric element) for the well-understood, simple, and reliable wick-and-heater arrangement taught by Whittemore in 1936.

Fox Decl. (Ex. 1003) ¶¶ 165-67



# Patent Owner Contradicts Its Previous Petition

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

R.J. Reynolds Vapor Company,  
Petitioner

v.

Fontem Holdings 1 B.V.

Patent Owner

U.S. Patent No.: 8,365,742  
Issue Date: Feb. 5, 2013  
Title: Aerosol Electronic Cigarette

Inter Partes Review No. IPR2016-01268

PETITION FOR INTER PARTES REVIEW OF  
U.S. PATENT NO. 8,365,742 PURSUANT TO  
35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42

Philip Morris Products, S.A.  
Exhibit 1021  
Page 001

**IPR 2016-01268**

the liquid. Thus, the PHOSITA would have been highly motivated to substitute the wick/heating wire configuration of Whittemore for the heating wire of Hon '043 to achieve the predicted result of more efficient heating, lower heating temperatures, and improved battery life. Ex. 1015 at ¶¶ 59-62.

RJRV Pet. (Ex. 1021) at 19

**R.J. Reynolds Vapor Company,  
Petitioner**



# Patent Owner Previously Argued That Whittemore Is More Efficient Than Hon

Then

IPR2016-01268

As explained herein, simple thermodynamics **would have motivated** the person having ordinary skill in the art (“PHOSITA”) to modify Hon ‘043 as taught by Whittemore. The PHOSITA would have readily appreciated that, because air is

\* \* \*

would require more battery power. In contrast, **Whittemore’s wick/heating wire configuration is more thermally efficient** than the configuration of Hon ‘043,

RJRV Pet. (Ex. 1021) 7, 8

Now

Patent Owner’s Response

Second, a POSA **would not have been motivated** to modify Hon to include the heater/wick design of Whittemore. (*See id.* at 26-28; Paper 6 at 33-34; Ex. 2010 at

\* \* \*

Moreover, **Hon’s heater is more efficient**, and thus works better and with less power consumption, than the heater in Whittemore’s wick/heater design because Hon is volatilizing tiny aerosol droplets rather than a continuous large volume of liquid as in Whittemore. (*Id.*)

Patent Owner’s Response at 34, 36



## Patent Owner's Contradictions Are Not Credible

“Under such circumstances, no reasonable fact finder would refuse to consider evidence of inconsistent sworn testimony. Moreover, any such inconsistencies would likely bear on the overall credibility of the expert.”

*Ultratec, Inc. v. Captional Call, LLC*, 872 F.3d 1267, 1273 (Fed. Cir. 2017)



# The Board Previously Credited The Identical Combination Of Hon And Whittemore

Then

## Final Written Decision (IPR2016-01268)

heating element) to obtain predictable results.” Pet. 19. In particular, we credit Patent Owner’s contention, supported by testimony from Mr. Meyst, that “[a] simple substitution as Petitioner proposes would be to remove the entire atomizer in Hon ’043 and replace it with Whittemore’s wire-wrapped wick dipped directly into liquid-supplying bottle 11.” PO Resp. 51–52.

RJRV FWD (Ex. 1022) at 17

Now

## Petition

A POSA would have been motivated to implement Hon’s device by replacing its complicated piezoelectric atomizer with a simpler and cheaper heater and wick (such as Whittemore’s) to reduce design costs and effort, reduce manufacturing costs including parts and assembly, increase reliability, and increase the expectation of success. Fox Decl. ¶¶ 158-168.

Petition at 50-51



# RJR's Ruyan Teardown Shows That A POSA Would Recognize Areas For Improvement in Hon's Design

## RJR's Teardown of Ruyan Device

Slower, longer puffs seem to generate more aerosol than shorter puffs, perhaps allowing more time for the heaters to reach a higher temperature.

\* \* \*

We then decided to lengthen the duration of the puff by one second (from 2 seconds to 3 seconds) based in part on comments from smokers who puffed on the cigar and indicated that a longer, slower puff seem to yield more aerosol. These observations were confirmed in the laboratory when the e-cigar yielded significantly more aerosol when the longer puffs were used.

\* \* \*

Our dissection of the e-cigar revealed an intricate and well-engineered design. The complexity of the design and the small margin for error in assembling the cigar suggest to us that it is hand-assembled. Hand assembly probably accounts for the relatively high cost of the e-cigar, approximately \$230.00 - \$260.00 US, although the exact electronic components of the cigar are not known and could also contribute significantly to manufacturing costs. (The website

RJR Teardown (Ex. 1023) at 15-16



# A POSA Would Know That Whittemore's Wick/Heater Offered Improvements Over The Hon/Ruyan Atomizer

## Stewart Fox (Petitioner's Expert)

159. To start, RJR's analysis of an actual implementation of Hon design requires a long and slow draw to produce a satisfactory amount of aerosol. Ex.

\* \* \*

160. A POSA would have realized that a separate problem with the Ruyan device's performance may have been with the design of the atomizer itself. As discussed above, Hon's atomizer relies on the user's draw to carry droplets of the liquid mixture from the ejection holes to the heater inside of the atomizer cavity. If the user draws on the device with too much or too little force (or for an insufficient amount of time), the heater could receive droplets of the liquid mixture in an unsatisfactory quantity (too much or too little) and quality (e.g., too big or too small). This may have contributed at least in part to the observed need for long and slow draws when using the Ruyan device. Improving the atomizer shape and/or

Fox Decl. (Ex. 1003) ¶¶159-60



## A POSA Would Know That Whittemore's Wick/Heater Offered Improvements Over The Hon/Ruyan Atomizer

### Stewart Fox (Petitioner's Expert)

161. On the other hand, wicks have long been well understood, so choosing an appropriate wick (e.g., size and material), heater, and physical arrangement (to ensure the wick is inserted into and in good contact with the fibrous/wicking material inside of Hon's bottle to ensure good capillary action out of the bottle) would have been well within a POSA's skill—and drastically simplified optimization of the design. As a result, a POSA would have had a reasonable expectation of success in achieving a suitable wick/heater combination to provide the desired amount of aerosol during the user's draw with much less effort than implementing Hon's complicated atomizer.

Fox Decl. (Ex. 1003) ¶ 161



## A POSA Would Know That Whittemore's Wick/Heater Offered Improvements Over The Hon/Ruyan Atomizer

### Stewart Fox (Petitioner's Expert)

168. In addition to reducing the difficulty and effort required to implement a satisfactory prototype, the heater/wick design would have also simplified (and reduced the cost) of manufacturing because it requires fewer (and cheaper) parts and less assembly. In addition, the simpler wick/heater would help alleviate the apparent reliability problems Ruyan encountered, as fewer and sturdier components generally result in more reliable production devices.

Fox Decl. (Ex. 1003) ¶ 168



## Ruyan and RJR's Teardown Evidence A POSA's Willingness To Combine Hon and Whittemore

“Evidence that a person of ordinary skill in the art recognized the same problem to be solved . . . Is, at the least, probative of a person of ordinary skill in the art’s willingness to search the prior art in the same field for a suggestion of how to solve that problem.”

\* \* \*

“Motivation to combine ‘may also come from the nature of a problem to be solved, leading inventors to look to references relating to possible solutions to that problem.’”

*Cross Medical Products, Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1322-23 (Fed. Cir. 2005) (internal quotations omitted)



## Patent Owner's Argument That Hon Cannot Be Combined With Whittemore Is Contrary To Law

“[Patentee]’s assertions that [one reference] cannot be incorporated into [a second reference] are **basically irrelevant**, the criterion being not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole.”

*In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc)



## The '123 Patent

### **Independent Claims 1 & 15**

“mixture ... wicked into contact”

**“puff-actuated controller”**

Hon

Hon + Brooks

### **Dependent Claims**

“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)



# “puff-actuated controller”

1. An electrically-powered, aerosol-generating smoking article comprising:

\* \* \*

a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw, the controller

'123 Patent, Claim 1

15. An electrically-powered, aerosol-generating smoking article comprising:

\* \* \*

a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw, the controller

'123 Patent, Claim 15

Technology and Development Co., Ltd. If desired, each of the heating elements 70, 72 can be arranged to have current pass therethrough (and hence provide heat) in response to a signal provided by a puff-actuated controller that regulates current through one or more of the heating elements in response to signals from the sensor 60. For example, each heating element 70, 72 can be turned “on” and “off” in response to a signal provided in response to the sensing mechanism 60 and related control circuitry. Alternatively, current flow through the first heating element 70 can be controlled during periods of normal use of the smoking article 10, and current flow through the second heating element 72 can be controlled only during periods of draw (i.e., the second heating element will be energized when the sensor 60 detects draw by the user).

'123 Patent at 21:48-62



## **“puff-actuated controller”**

- i. Hon teaches a puff-actuated controller**
- ii. Brooks undisputedly teaches a puff-actuated controller, and a POSA would be motivated to implement Brooks’ controller in Hon**



# Institution Decision - “puff-actuated controller”

## Institution Decision

Accordingly, on the record before us, we are persuaded that Petitioner’s discussion of the particular structures in Hon, and the explanations in the Petition and the Fox Declaration, sufficiently show that Hon teaches a puff-actuated controller adapted for regulating current during draw as described by the ’123 patent and required by claims 1 and 15.

\* \* \*

After reviewing the parties’ arguments and evidence, we are persuaded that Petitioner’s discussion of the particular structures in Hon and Brooks, and the explanations in the Petition and the Fox Declaration, sufficiently show that Petitioner’s proposed combination of Hon and Brooks teaches a puff-actuated controller adapted for regulating current during draw as the ’123 patent describes and claims 1 and 15 require. Pet. 25–29;

Institution Decision at 31, 32



## The '123 Patent

### **Independent Claims 1 & 15**

“mixture ... wicked into contact”

**“puff-actuated controller”**

**Hon**

Hon + Brooks

### **Dependent Claims**

“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)

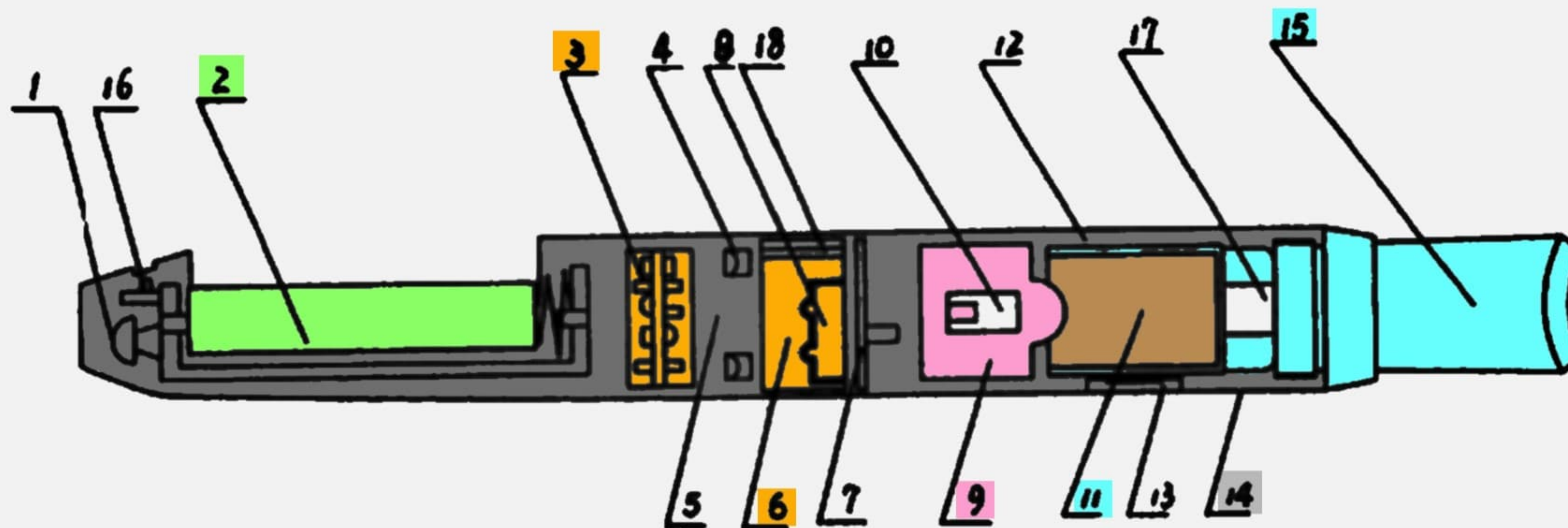


# Hon Teaches A “puff-actuated controller”

## Petition

This limitation is taught by Hon. As shown below, Hon’s e-cigarette includes a puff-actuated controller (on “electronic circuit board 3”) with a sensor adaptor for sensing draw (“sensor 6”) (both orange) within a tubular outer housing (“enclosure 14,” gray).

Petition at 23



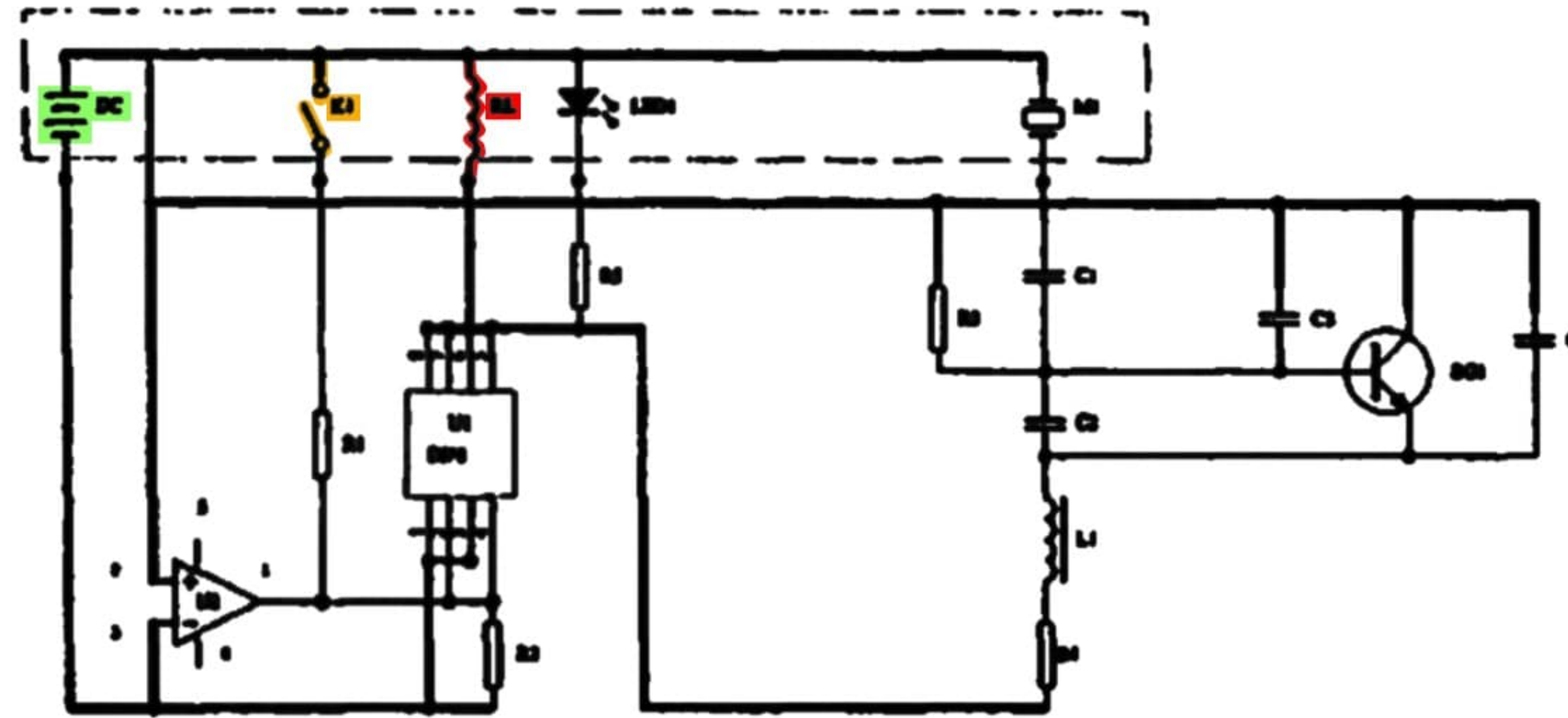
Hon (Ex. 1005) Fig. 1 (annotated)



# Hon Teaches A “puff-actuated controller”

## Petition

Hon at 6-7; Fox Decl. ¶¶ 102-103. Hon’s control circuit is shown below, with the battery (DC) in green, reed switch 19 (K1) in orange, and heater (RL) in red:



Hon Fig. 12 (annotated); Fox. Decl. ¶ 104.<sup>4</sup> Thus, when field effect transistor U1 is turned on as described above, heating element RL is energized, and stays energized until the user stops drawing on the device. Hon at 6 (“[W]hen K1 is closed, U1, i.e. the field effect transistor, is turned on; RL starts”). According to the ’123 patent,

Petition at 24; Hon (Ex. 1005) Fig. 12 (annotated)



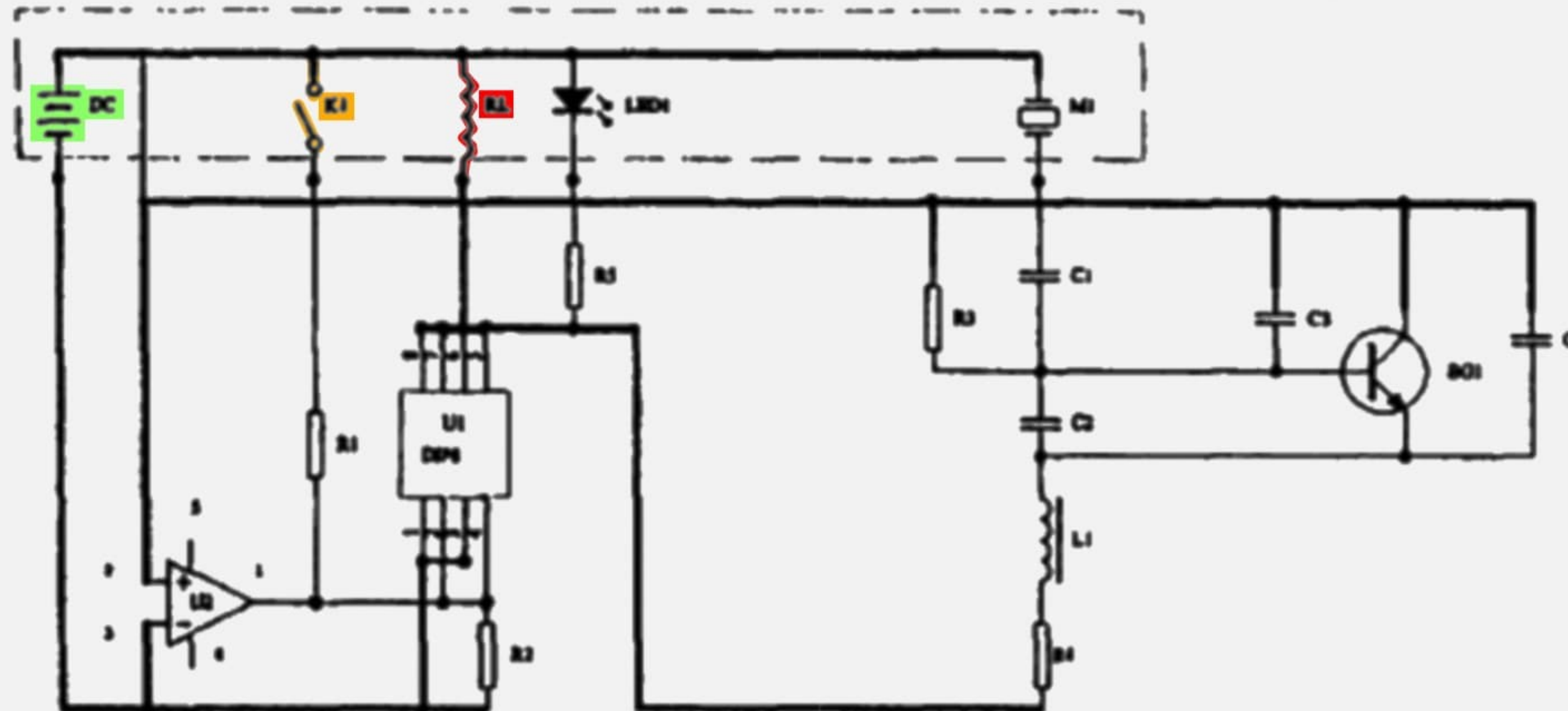
# Hon Teaches A “puff-actuated controller”

When a smoker smokes, the mouthpiece 15 is under negative pressure; the air pressure difference or high-speed stream between the normal pressure cavity 5 and the negative pressure cavity 8 will cause the sensor 6 to output an actuating signal; the electronic circuit board 3 connected therewith goes into operation. At this point, the ripple film 22 in the sensor 6 is deformed to drive the second magnet 21 away from the reed switch 19; the reed switch 19 is closed (i.e. K1 is closed) under the effect of the excessive magnetic line of force of the first magnet 20, starting the electric switch of the field effect transistor (i.e. U1 starts); the high-frequency oscillator is a Colpitts oscillator; the frequency is

\* \* \*

constitute a Colpitts oscillator. The circuit principle is that when K1 is closed, U1, i.e. the field effect transistor, is turned on; RL starts; the Colpitts oscillator starts oscillating at the same time; M1 provides

Hon (Ex. 1005) at 6-7



Hon (Ex. 1005) Fig. 12 (annotated)



## Hon Undisputedly Teaches An Airflow Sensor That Turns The Heater On And Off Using Current

### Charles Clemens (Patent Owner's Expert)

Q. Hon's electronic cigarette has a heating element that can be turned from on to off in response to detecting the airflow from a user's draw on the device. Right?

A. **Yes, the reed switch sensor is used to sense that and does turn the electronic circuit on and off.**

Clemens Tr. (Ex. 1042) at 70:10-16

Q. So in Hon, when a user draws on the electronic cigarette, a sensor outputs a signal that ultimately results in the heating element being turned on.

A. **Yes.**

Q. Hon's circuitry sends a specific amount of current to its heating wire when it detects a user's draw. Right?

A. **Yes, that's fair.**

Clemens Tr. (Ex. 1042) at 71:14-118:1



## Patent Owner Wrongly Argues That Turning Hon's Heater On And Off Is Not Current Regulation

### Patent Owner's Response

element. (*See* Petition at 23-24.) But turning the current on, which is performed by Hon's reed switch upon sensing draw, is not current regulation. (Ex. 2010 at ¶ 102.)

Patent Owner's Response at 46



## The '123 Patent Specification Confirms That Turning The Heater On And Off “regulates current”

### '123 Patent

Technology and Development Co., Ltd. If desired, each of the heating elements 70, 72 can be arranged to have current pass therethrough (and hence provide heat) in response to a signal provided by a puff-actuated controller that regulates current through one or more of the heating elements in response to signals from the sensor 60. For example, each heating element 70, 72 can be turned “on” and “off” in response to a signal provided in response to the sensing mechanism 60 and related control circuitry. Alternatively, current flow through the first heating element 70 can be controlled during periods of normal use of the smoking article 10, and current flow through the second heating element 72 can be controlled only during periods of draw (i.e., the second heating element will be energized when the sensor 60 detects draw by the user).

'123 Patent at 21:48-62



## Mr. Clemens Agrees That Turning The Heater On And Off Is “regulating current”

### Charles Clemens (Patent Owner’s Expert)

Q. One of the examples of **regulating current flow** in the '123 patent is to turn the heating elements on and off in response to a signal from a sensor. Right?

**A. That is correct.**

Clemens Tr. (Ex. 1042) at 94:14-18



## The '123 Patent

### **Independent Claims 1 & 15**

“mixture ... wicked into contact”

**“puff-actuated controller”**

Hon

**Hon + Brooks**

### **Dependent Claims**

“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)



# Brooks (Ex. 1006)

## United States Patent [19]

Brooks et al.

[11] Patent Number: 4,947,874

[45] Date of Patent: Aug. 14, 1990

### [54] SMOKING ARTICLES UTILIZING ELECTRICAL ENERGY

[75] Inventors: Johnny L. Brooks; Donald L. Roberts, both of Winston-Salem; Jerry S. Simmons, Rural Hall, all of N.C.

[73] Assignee: R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

[21] Appl. No.: 242,086

[22] Filed: Sep. 8, 1988

[51] Int. Cl. A24D 1/00; A24F 1/00; A24F 47/00; A61M 16/00

[52] U.S. Cl. 131/329; 131/273; 131/194; 128/202.21; 128/203.26; 128/203.27; 128/204.21

[58] Field of Search 131/329, 194, 273; 128/202.21, 202.27, 203.12, 203.13, 203.15, 204.21, 203.17, 203.26, 203.27, 204.13, 204.23

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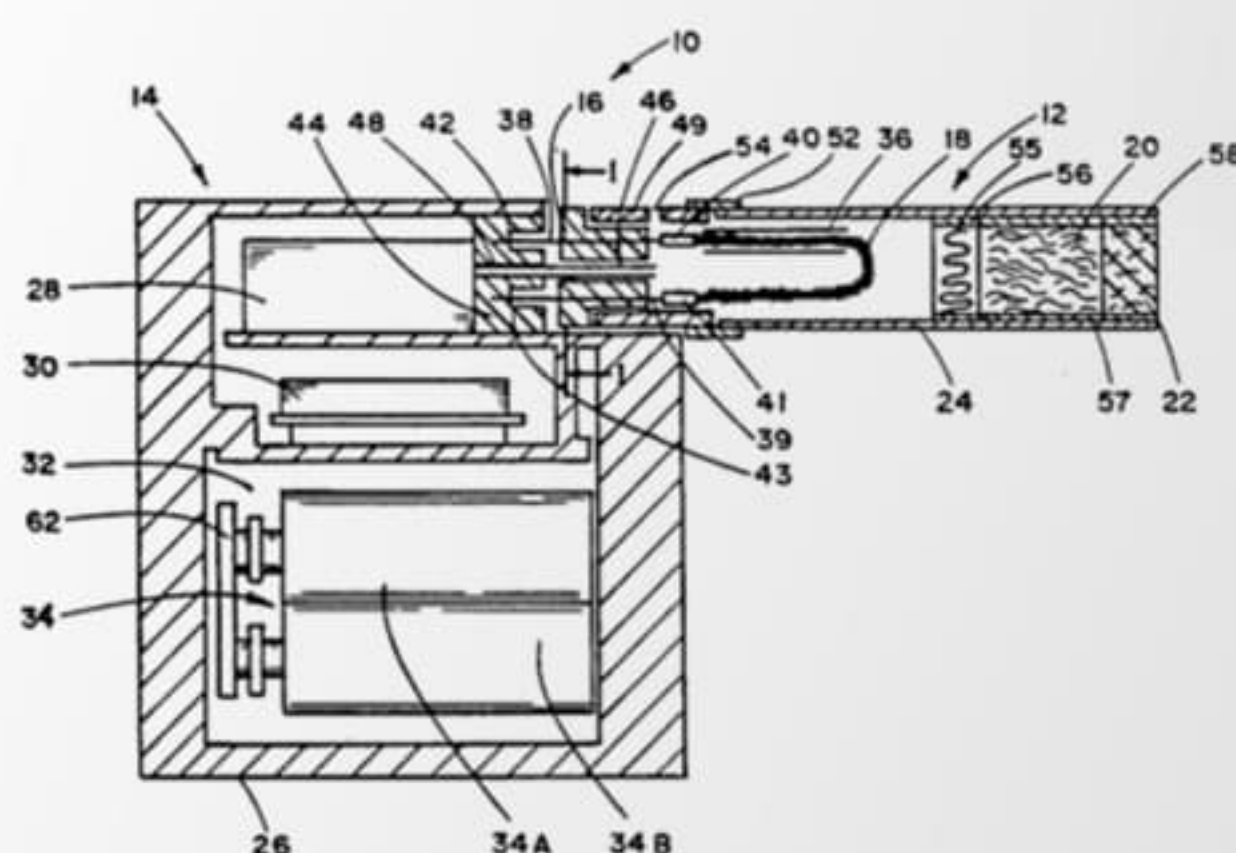
Tobacco and Tobacco Smoke, Wynder et al., pp. 482 and 522 (1967).

Primary Examiner—V. Millin

#### [57] ABSTRACT

Smoking articles employ an electrical resistance heating element and an electrical power source to provide a tobacco-flavored smoke or aerosol and other sensations of smoking. The smoking articles advantageously comprise a disposable portion and a reusable controller. The disposable portion, which may be a cigarette, normally includes (i) an air permeable resistance heating element having a surface area greater than 1 m<sup>2</sup>/g, which usually carries an aerosol forming material, and (ii) a charge or roll of tobacco. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

202 Claims, 8 Drawing Sheets



Philip Morris Products, S.A.  
 Exhibit 1006  
 Page 001

[11] Patent Number: 4,947,874

[45] Date of Patent: Aug. 14, 1990

[75] Inventors: Johnny L. Brooks; Donald L. Roberts, both of Winston-Salem; Jerry S. Simmons, Rural Hall, all of N.C.

### ABSTRACT

Smoking articles employ an electrical resistance heating element and an electrical power source to provide a tobacco-flavored smoke or aerosol and other sensations of smoking. The smoking articles advantageously comprise a disposable portion and a reusable controller. The disposable portion, which may be a cigarette, normally includes (i) an air permeable resistance heating element having a surface area greater than 1 m<sup>2</sup>/g, which usually carries an aerosol forming material, and (ii) a charge or roll of tobacco. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

Brooks (Ex. 1006) at 1



# Patent Owner Does Not Dispute That Brooks Teaches This Limitation

## Patent Owner's Response

B.	Claims 1 and 15: “a puff-actuated controller within the tubular outer housing and adapted for regulating current flow through the electrical resistance heater during draw” .....	44
1.	Hon Does Not Disclose The Claimed Controller .....	44
2.	Petitioner Has Not Demonstrated That It Would Have Been Obvious To Modify Hon With Brooks.....	47

Patent Owner's Response at ii (Table of Contents)



# Brooks Expressly Teaches a “puff-actuated” Controller

Brooks

[57]

## ABSTRACT

Smoking articles employ an electrical resistance heating element and an electrical power source to provide a tobacco-flavored smoke or aerosol and other sensations of smoking. The smoking articles advantageously comprise a disposable portion and a reusable controller. The disposable portion, which may be a cigarette, normally includes (i) an air permeable resistance heating element having a surface area greater than 1 m<sup>2</sup>/g, which usually carries an aerosol forming material, and (ii) a charge or roll of tobacco. The reusable controller normally includes a puff-actuated current actuation means, a time-based current regulating means to control the temperature of the heating element, and a battery power supply.

Brooks (Ex. 1006) at Abstract

The circuit includes a puff actuated control switch 28, or some other suitable current actuation/deactuation mechanism, such as a manually actuated on-off switch, a temperature actuated on-off switch, or a lip pressure actuated switch. The preferred puff actuated switch 28 enables current to pass through the heating element 18 only during draw on the article. A typical

Brooks (Ex. 1006) at 12:47-53



# A POSA Would Implement Brooks' Controller In Hon

## Petition

Furthermore, a POSA would have been motivated to use Brooks's controller when implementing Hon to achieve the "accurate and sophisticated current actuation and current regulati[on]." Brooks 4:50-5:26; Fox Decl. ¶¶ 78, 108-114.

Petition at 28



## **A POSA Would Implement Brooks' Controller In Hon**

- 1) The '123 patent admits that Brooks offers a suitable controller for an e-cigarette**
- 2) Brooks' controller offered "accurate and sophisticated" control**
- 3) Brooks' overheating protection improved Hon**
- 4) Brooks provides detailed assembly instructions for its controller**



## I) The '123 Patent Admits Brooks Offers A Suitable "Representative" Controller

in FIGS. 4-5. The electrically-powered components 50 are powered by the battery 36. Representative types of electronic control components are of the type can be of the type possessed by the Ruyan Atomizing Electronic Cigarette available from Ruyan SBT Technology and Development Co., Ltd. See, also, the types of electronic systems set forth in U.S. Pat. No. 4,947,874 to Brooks et al.

The representative smoking article 10 incorporates suitably adapted sensing mechanism 60 in order to provide for operation of the electrically powered components during desired periods of time. Representative types of sensing mechanism components are incorporated within a device available as Ruyan Atomizing Electronic Cigarette from Ruyan SBT Technology and Development Co., Ltd. See, also, those types of airflow sensing mechanisms proposed in EPO 1,618,803 to Hon; and U.S. Pat. No. 4,735,217 to Gerth et al.; U.S. Pat. No. 4,947,874 to Brooks et al.; and 5,388,574 to Ingebretsen. The sensing mechanism 60 also can be

Brooks (Ex. 1006) at 20:42-48; 20:49-59



## 2) Brooks' Controller Offered Improved Current Control

### Brooks

watts of power or more, and (ii) accurate and sophisticated current actuation and current regulating means that normally would be too costly to incorporate into a single use, disposable article.

\* \* \*

usually between about 150° C. and about 350° C. Thereafter, the control circuit, by regulating, restricting or interrupting current flow through the resistance element, normally maintains the heating element within the desired temperature range during the balance of the puff and/or ensures that the heating element does not overheat during puffing.

Brooks (Ex. 1006) at 4:54-58; 5:6-12



### 3) Brooks' Overheating Protection Improved Hon

#### Stewart Fox (Petitioner's Expert)

113. However, a rapidly heating (high-powered) heater would overheat, or at the very least, continue to heat past a satisfactory temperature during the puff when using Hon's puff-actuated controller because **Hon's controller does not control the heater's temperature.** A POSA would have understood that this is not desirable: heating past the desired temperature wastes battery energy, may cause undesired heat-related degradation of the material being volatilized, may cause the device to become uncomfortably warm in the user's hand, and may present a safety/fire hazard.

Fox Decl. (Ex. 1003) ¶ 113

#### Brooks

usually between about 150° C. and about 350° C. Thereafter, the control circuit, by regulating, restricting or interrupting current flow through the resistance element, normally maintains the heating element within the desired temperature range during the balance of the puff and/or **ensures that the heating element does not overheat during puffing.**

Brooks (Ex. 1006) at 4:54-58; 5:6-12



## 4) Brooks Details How To Assemble Its Controller

Brooks

### B. Assembly of the Controller

The control circuit employed is schematically illustrated in FIG. 9. It was designed to provide uninterrupted current flow through the heating element for 1 second after the commencement of a puff. During the balance of the puff, the control circuit was designed to alternately switch off for 5 milliseconds and then on for 5 milliseconds (a 50 percent duty cycle), until the pressure actuated control switch opened. Comparator 114 was a Model LM 311 obtained from National Semiconductor. As shown in FIG. 9, connections were made at

Brooks (Ex. 1006) at 17:40-66

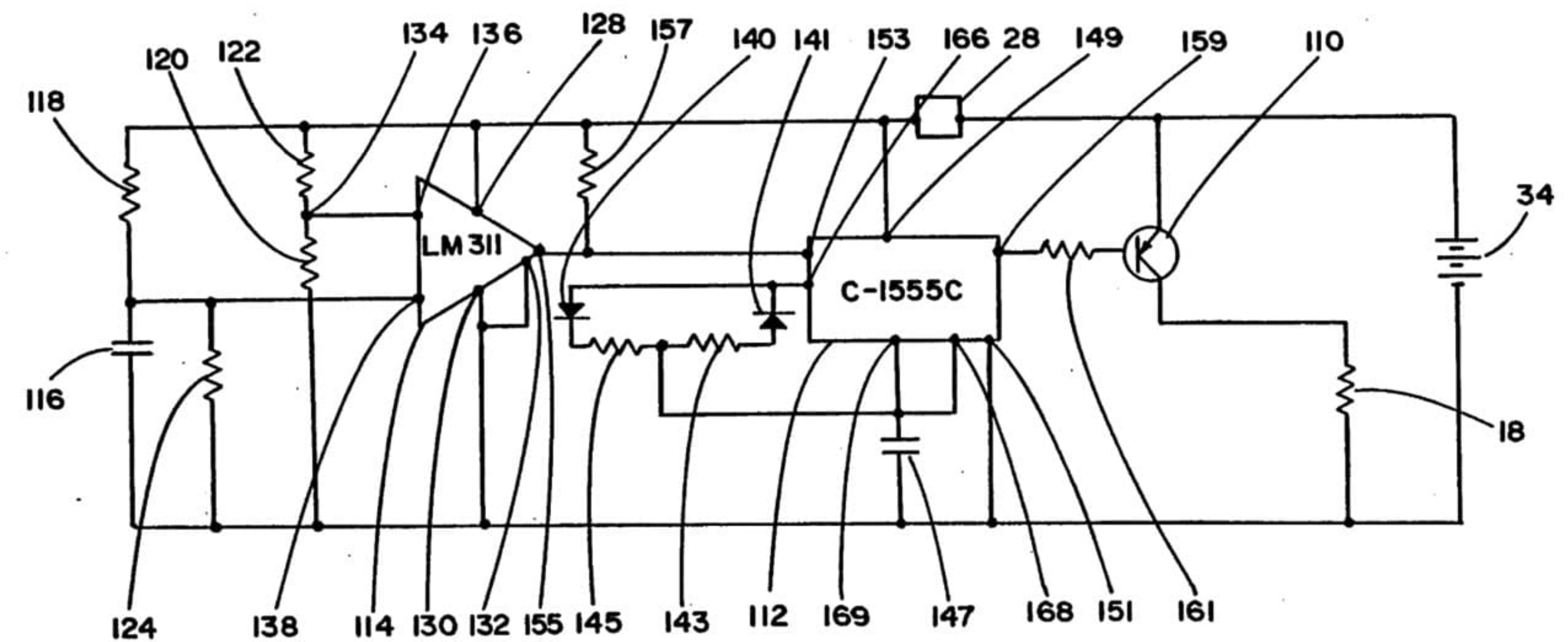


FIG. 9

Brooks (Ex. 1006) Fig. 9



## Reasonable Expectation of Success Does Not Require “Absolute Certainty”

“The prior art . . . made clear that the use of the [claimed] technology . . . ***had become fairly reliable and showed consistent results.*** . . . The reasonable expectation of success requirement for obviousness ***does not necessitate an absolute certainty*** for success.”

*PAR Pharms, Inc. v. TWI Pharms, Inc.*, 773 F.3d 1186, 1198 (Fed. Cir. 2014)



## The '123 Patent

### Independent Claims 1 & 15

“mixture ... wicked into contact”

“puff-actuated controller”

### **Dependent Claims**

**“cartridge is electrically conductive” (claims 11 and 23)**

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

nicotine formulations (claims 6 and 19)



# “cartridge is electrically conductive”

**11.** The smoking article of claim **1**, wherein the cartridge is electrically conductive.

'123 Patent, Claim 11

**23.** The smoking article of claim **15**, wherein the cartridge is electrically conductive.

'123 Patent, Claim 23



## The '123 Specification Confirms That A Cartridge Can Be Made Of “a variety of materials”

### '123 Patent

rates a cartridge 85. The cartridge can be manufactured from a variety of materials, **such as metal** (e.g., aluminum or stainless steel), paper (e.g., paperboard or paper coated with a hydrophobic film or coating), plastic (e.g., polyester, polypropylene, nylon, polycarbonate, or the like). The car-

'123 Patent at 21:64-22:1



# A POSA Would Implement Hon With Known Materials

Stewart Fox (Petitioner's Expert)

use to implement Hon's cartridge. A POSA implementing Hon **would have been able to select appropriate materials for the cartridge**, taking into consideration appropriate physical and chemical properties, cost, ease of manufacture, and so forth. Indeed, many different materials would be suitable or at least obvious to try. Ex. 1027 at 4:65-68 (explaining that a vaping device “may be comprised of *nearly any desired material*, molded plastic being particularly preferred.”); Brooks 9:39-41 (housing made from “plastic, metal, and the like”).

Fox Decl. (Ex. 1003) ¶ 179



# Metal Materials Were Known In Electronic Smoking Devices

Hon

set on the other side. A second piezoelectric element is set in the atomizer. The porous body in the atomizer may be made of nickel foam, **stainless steel fiber felt**, high molecular polymeric foam, and ceramic foam. The heating element may be made of platinum wires, nichrome, or iron-chromium-

Hon (Ex. 1005) at 5

Brooks

holder for the user. **The outer housing 26 can have a variety of shapes and can be manufactured from plastic, metal, or the like.** Controller 14 includes an insulative

Brooks (Ex. 1006) at 9:39-41

Kessler

the material to be vaporized. A general purpose embodiment that is useful for both solid and liquid forms of source material is a basket fabricated from **fine wire mesh** such as Tetco 50/.009/304 (Tetco Inc., Briarcliff Manor, N.Y.). Alternatively, when a device is to be used only to vaporize liquid substances, the source material container 52 may be a porous plug, e.g. a plug fabricated from **sintered stainless steel** or **copper** or a porous polymer suitable for elevated

Kessler (Ex. 1030) at 7:27-33



# Using Metal In Hon's Cartridge Would Have Reduced Heat Damage

## Stewart Fox (Petitioner's Expert)

187. As I explained at the outset for these claims, a POSA would have tried many different materials. That include **metals, which generally conduct electricity and heat better than non-metals.**

\* \* \*

189. When implementing Hon, a POSA would have been motivated to try these materials in Hon's corresponding "liquid supply bottle" to absorb and retain its liquid mixture, **eliminating any risk of heat-related damage** from the heater (whether using Hon's atomizer or Whittemore's wick/heater).

Fox Decl. (Ex. 1003) ¶¶ 187-189



# Patent Owner Wrongly Requires “wires” Connected To A Cartridge

## Patent Owner’s Sur-Reply

Petitioner cannot and does not dispute that, even if Hon was modified to change a portion of its cartridge to metal, **none of the wires in Hon’s device are connected in any way to Hon’s cartridge**, and there would be nothing in Hon’s device transferring any electrical current to such a modified cartridge. (*See Reply at 25; POR at 57; Ex.*

Patent Owner’s Sur-Reply at 20

**23.** The smoking article of claim **15**, wherein the cartridge is electrically conductive.

’123 Patent, Claim 23

**11.** The smoking article of claim **1**, wherein the cartridge is electrically conductive.

’123 Patent, Claim 11



## The '123 Patent

### Independent Claims 1 & 15

“mixture ... wicked into contact”

“puff-actuated controller”

### **Dependent Claims**

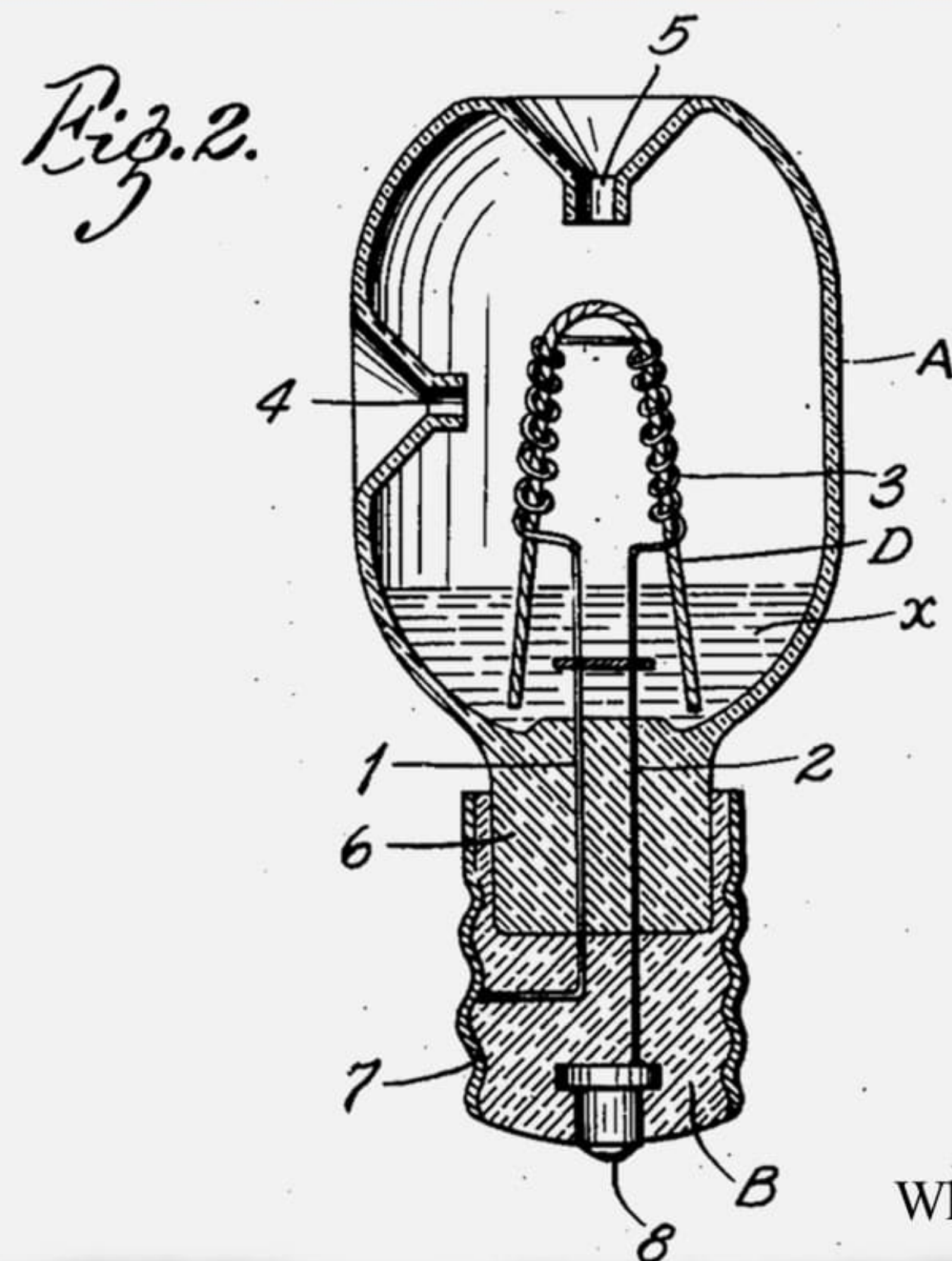
“cartridge is electrically conductive” (claims 11 and 23)

**“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)**

nicotine formulations (claims 6 and 19)



# No Dispute Whittemore Teaches “absorbent fibrous material is in contact with the ... heater”



Whittemore (Ex. 1007) Fig 2

such a way that a portion of said wick is always in contact or approximate contact with the heating element or filament 3, and a portion of said wick is always in contact with the medicament in the vaporizing vessel, whereby said medicament will be carried by capillary action to a point where it will be vaporized by the heat from the filament 3. In the form of my invention

Whittemore (Ex. 1007) at 2:1-8

## Charles Clemens (Patent Owner's Expert)

Q. Whittemore discloses wicking the liquid into contact with the electrical resistance heater by placing the wick in contact with the heater.

\* \* \*

A. That -- yeah, that is what it is indicating.

Clemens Tr. (Ex. 1042) at 25:20-26:9



## The '123 Patent

### Independent Claims 1 & 15

“mixture ... wicked into contact”

“puff-actuated controller”

### **Dependent Claims**

“cartridge is electrically conductive” (claims 11 and 23)

“absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

**nicotine formulations (claims 6 and 19)**



# Nicotine Formulations

**6.** The smoking article of claim 1, wherein the mixture comprises essentially pure nicotine, extracts composed predominantly of nicotine, or formulations composed predominantly of nicotine.

'123 Patent, Claim 6

**19.** The smoking article of claim 15, wherein the mixture comprises essentially pure nicotine, extracts composed predominantly of nicotine, or formulations composed predominantly of nicotine.

'123 Patent, Claim 19



# Ray (Ex. 1009)

## United States Patent [19]

Ray

[11] 4,284,089

[45] Aug. 18, 1981

### [54] SIMULATED SMOKING DEVICE

3,683,936 8/1972 O'Neil, Jr. 131/170 A X

[76] Inventor: Jon P. Ray, 12544 Judson Rd., San Antonio, Tex. 78233

### FOREIGN PATENT DOCUMENTS

276250 6/1967 Australia 131/170 A

[21] Appl. No.: 136,420

Primary Examiner—Stephen C. Pellegrino  
Attorney, Agent, or Firm—Arnold, White & Durkee

[22] Filed: Apr. 2, 1980

### Related U.S. Application Data

[63] Continuation of Ser. No. 947,373, Oct. 2, 1978, abandoned.

[51] Int. Cl.<sup>3</sup> A24F 47/00

[52] U.S. Cl. 131/270; 128/202.21

[58] Field of Search 131/8 A, 10.1, 170 A, 131/170 R, 261 A, 10.3, 10.5; 128/202.21

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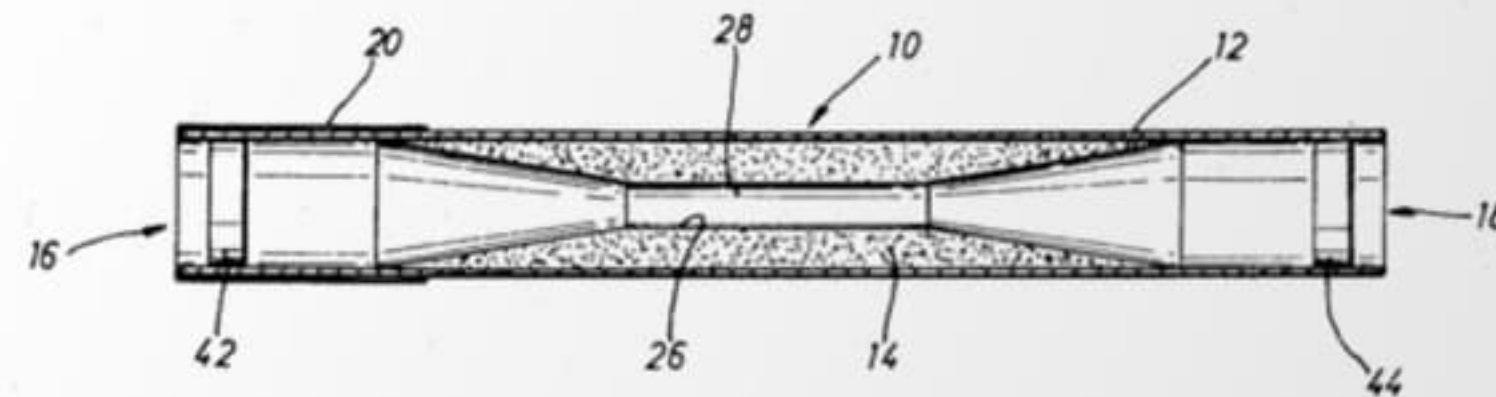
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3,347,231	10/1967	Chang	131/170 A
3,404,692	10/1968	Lampert	128/202.21 X

### [57] ABSTRACT

A simulated smoking device, adapted for non-burning or non-combustion uses, comprises: a container defining a passageway therethrough; a source of vaporizable nicotine in fluid communication; and means for preventing the evaporation of said nicotine during periods of non-use. The source of vaporizable nicotine may be an absorbent material which has a nicotine-bearing material absorbed therein. The absorbent may also have absorbed therein a pH adjustment, water and/or flavoring ingredients. The device, at ambient temperatures and pressures, releases nicotine vapors into air drawn through the passageway of the container during use.

34 Claims, 5 Drawing Figures



Philip Morris Products, S.A.  
Exhibit 1009  
Page 001

[11] 4,284,089

[45] Aug. 18, 1981

[76] Inventor: Jon P. Ray, 12544 Judson Rd., San Antonio, Tex. 78233

[57] ABSTRACT

A simulated smoking device, adapted for non-burning or non-combustion uses, comprises: a container defining a passageway therethrough; a source of vaporizable nicotine in fluid communication; and means for preventing the evaporation of said nicotine during periods of non-use. The source of vaporizable nicotine may be an absorbent material which has a nicotine-bearing material absorbed therein. The absorbent may also have absorbed therein a pH adjustment, water and/or flavoring ingredients. The device, at ambient temperatures and pressures, releases nicotine vapors into air drawn through the passageway of the container during use.

Ray (Ex. 1009) at 1



# Ray Teaches Essentially Pure Nicotine and Predominantly Nicotine Solutions

Ray

It has been found that a number of substances may be advantageously provided in the nicotine mixture which is placed in absorbent member 14. Nicotine (d), nicotine (l), nicotine (dl), nicotine salts, and nicotine esters may all be used to advantage in this mixture to provide the nicotine vapors which are inhaled by the user. 98 per-  
cent nicotine (l), a product obtained from Eastman,  
stock number 1242, has been used in one embodiment of  
the device and found to perform with satisfactory re-  
sults. A preparation of nicotine hydrochloride with a pH of 7 has also been successfully employed. A number

Ray (Ex. 1009) at 6:60-7:2



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Ray (Ex. 1009) at 6:60-7:2



# Hon Teaches A Nicotine Solution

**[54] Title of Utility Model** Atomizer Electronic Cigarette

**[57] Abstract**

The present utility model relates to an atomizer electronic cigarette **containing no tar and only nicotine,** comprising an enclosure and a mouthpiece;

Hon (Ex. 1005) at 1

The **nicotine solution contains 0.4-3.5% nicotine,** tobacco flavor 0.05-2%, organic acid 0.1-3.1%, and antioxidant 0.1-0.5%, and the rest is 1, 2-propylene glycol.

Hon (Ex. 1005) at 8



## A POSA Would Have Implemented Hon's Nicotine Solution Using Ray's 98% Nicotine

### Stewart Fox (Petitioner's Expert)

214. A POSA would have made that mixture by combining pure ingredients in the desired ratios to arrive at the desired nicotine strength and flavor profile. Ray 6:65-7:1, 7:42-45 (Ex. 1009, showing that 98% nicotine, “stock number 1242” from “Eastman” was commercially available).

Fox Decl. (Ex. 1003) ¶ 214



## It Was Well-Known To Create Nicotine Solutions Using Essentially Predominantly Nicotine

Ruyan Website (2006)



Ex. 1013 at 5

### RJR's Teardown of Ruyan Device

contained a natural tobacco extract. It appears the nicotine content of the extract had been enhanced in all three levels of nicotine-containing cartridges (Low, Mid, High). A "0" cartridge contained little, if any, nicotine.

Ex. 1023 at 10



## RJR's Teardown of the Ruyan Device Illustrates A POSA's Background Knowledge

“[N]on-prior art evidence of what was known . . . can be relied on for their proper supporting roles, e.g., ***indicating the level of ordinary skill in the art***, what certain terms would mean to one with ordinary skill in the art, and ***how one with ordinary skill in the art would have under-stood a prior art disclosure.***”

*Yeda Research & Dev. Co. v. Mylan Pharms., Inc.*, 906 F.3d 1031, 1041-42 (Fed. Cir. 2018) (internal quotations omitted)



# The '123 Patent

## Independent Claims 1 & 15

✓ “mixture ... wicked into contact”

✓ “puff-actuated controller”

## Dependent Claims

✓ “cartridge is electrically conductive” (claims 11 and 23)

✓ “absorbent fibrous/wicking material is in contact with the ... heater” (claims 14 and 24)

✓ nicotine formulations (claims 6 and 19)